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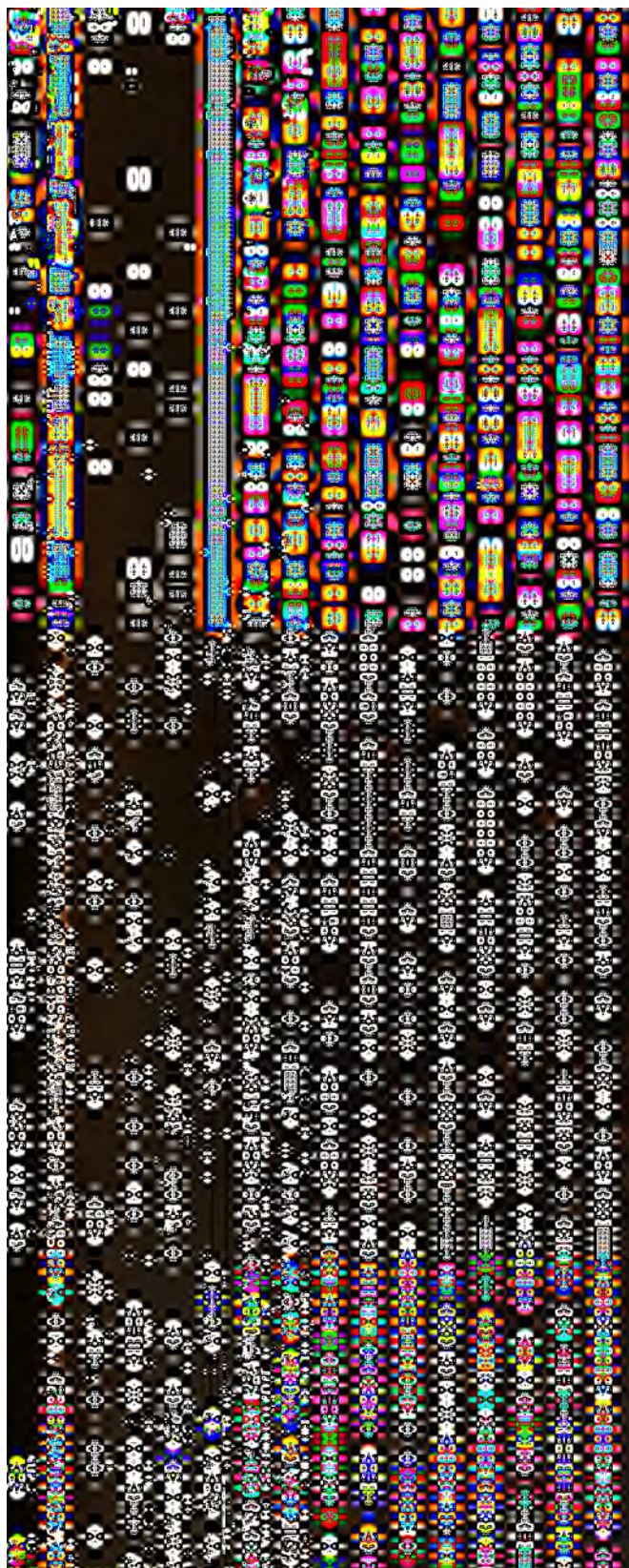
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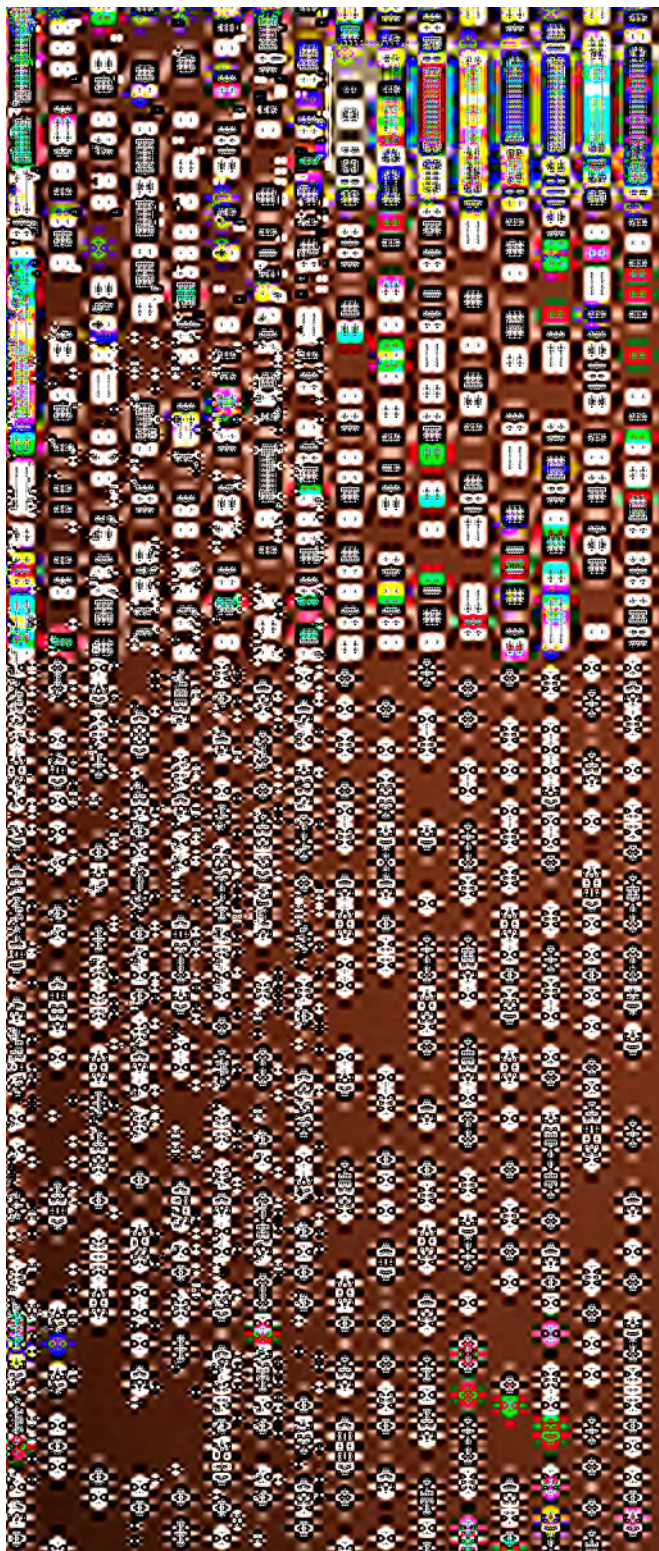
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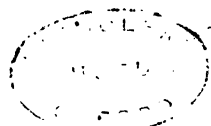


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A Biographical Notice of Sam. Crooke, Rector of Wrington, A.D.
1602-1649. By E. GREEN.

(Read March 12th, 1873.)

Samuel Crooke was born on the 17th of January, 1574, at Great Waldingfield, in the county of Suffolk, of which place his father, Thomas Crook, D.D., was Rector.* He was educated at Merchant Taylor's School, and then entered Cambridge as a scholar at Pembroke Hall. Here he was much esteemed for his great industry, his comely person, and agreeable society. He became skilled in music, and accurate in Greek, Hebrew and Arabic. He also spoke and well understood Italian, Spanish and French, and had read many works in those languages. These qualifications caused him to be elected almost unanimously a Fellow of Pembroke Hall, but the Master opposing, and giving his vote against him, he was disqualified. Being thus rejected at Pembroke he was afterwards admitted a first foundation Fellow of Emmanuel College, and was there considered one of its choicest ornaments. He was also appointed Rhetoric Reader and then Philosophy Reader in the Public Schools. As a qualification for his Fellowship he took orders on the 24th Sept., 1601, and what was then considered a rare thing for the Fellow of a College to do, commenced preaching at Caxton, near Cambridge, and it is recorded that he preached twenty-eight sermons in eleven months. In Sept., 1602, he was presented by Sir Arthur Capell, of Little Hadham, Hertfordshire, to the Rectory of Wrington, and went at once to his new work, to "manure and manage a most uncultivated spot," and amongst "a people who had never before known a preaching minister." In his parish, and the country round, he was the first who, "by preaching of the Gospel, brought religion into notice and credit" there.

Soon after he was settled in his new home, he married "one of his own tribe," Juditha, the eldest daughter of Mr. Walsh, a minister in Suffolk, and a "great and rare light in his time."

* *Athenæ Cantab.*

This lady proved to be a prudent, loving and tender wife, zealous and active for his comfort in all things, a "meet helper, indeed, all the days of their conjugal lives."*

The first years of his residence passed tranquilly enough. Occupying much time in his study he from time to time published an occasional work. The first was "A Guide unto True Blessednesse," &c. 8vo., 1613. This is dedicated to Sir Arthur Capel, Knight, his "singular good patrone," and addressed to all Christian readers, especially those of "my charge, inhabitants of Wrington, in Somersetshire." After this, in the same year, there was an epitome of this Guide, entitled, "A Briefe Direction to True Happinesse, for the more Convenient Use of Private Families and Instruction of the Yonger Sort." And then the three following Sermons, all 8vo., 1615 :—"The Waking Sleeper," from Cant. v., 2; "The Ministerial Husbandry and Building," from 1 Cor. iii., 9, preached at the Triennall Visitation at Bath, July 30th, 1612; and "The Discovery of the Heart," from Matt. vi., 21, "in a sermon preached unto an honourable assembly at Bath," 19th September, 1613; also in 1619, 8vo., "Death Subdued, or the Death of Death," from Hosea xiii., 14, preached on Ascension Day, 1619†. At his death he left unpublished on account of the troubled times, another work which was afterwards printed in two parts, folio, 1658,‡ entitled "Divine Characters," distinguishing the more secret differences between—1. The hypocrite in his best dresse of seeming virtues and the true Christian in his real graces. 2. Between the Blackest weeds of dayly infirmities of the truly Godly and the reigning sinnes of the unregenerate that pretend unto godlinesse.

Always active and energetic in his ministerial work, he was the first to introduce catechising as a means of instruction. It was for this purpose that he published his second book, "The Guide

* Anthologia. † Bodleian.

‡ Bibliotheca Britan.

to True Happinesse," which he called his "Lesser Catechism." On the title page, for motto, is the text, improved to meet the occasion, from Proverbs xxii, 6, "Train up (catechise) a child in the way he should go," &c., &c. He also established a Tuesday Lecture, which attracted notice in the neighbourhood, but this, by the interference of the Bishop, was stopped. With the exception of this little matter he seems to have lived on quietly for some forty years, seeing himself respected in his own pariah and his influence constantly increasing through a wide district around it.

During the latter half of this time, however, serious difficulties both Civil and Ecclesiastical had been troubling the whole of England.

Archbishop Laud had brought Episcopacy into such prominent disfavour that in April, 1642, the Commons declared their intention to reform the Government of the Church. For their assistance and consultation they voted that an Assembly of learned and godly Divines should be called, and the matter so far advanced that the names approved for each county were sent up. Those selected for Somerset were Mr. Samuel Croke, of Wrington, and Mr. John Conant, of Limington.* But for want of thorough approval in the House of Lords, the subject after several notices was allowed to drop for a short time, and this Assembly existed only in name.

Then came the troubles of the Civil War in August, 1642. Mr. Croke at once declared for the Parliament, and soon became a public man, by his zeal and activity in its behalf. Being now so well known, he was better able than any man to influence large numbers, and by his personal exertions many thousands were persuaded and encouraged to join his party.† That party soon attacked the Established Church, abolished the office of Bishop, and the use of the surplice, and showed a strong tendency

* A catalogue of names approved, &c.

† Mercurius Aulicus. No. 39.

towards the Presbyterian plan ; and it is probable that a newly modelled or reformed service, having a like tendency, was early in use at Wrington. Mr. Crooke was the first to introduce into his neighbourhood and parish, conceived prayer, *i.e.*, extemporary prayer, presumably conceived at the moment of utterance. In this practice he excelled, being "free from impertinent expressions, and vain repetitions ; rich in piercing supplications and pathetical thanksgiving ; prompt and full in expressing the feelings to the bottom of their hearts" of those who joined with him, so that "their souls seemed to have entered into his."*

At length in June, 1643, the Parliament fully adopted the Presbyterian as the national system, and took the Solemn League and Covenant, by which they swore to establish it, and to oppose and not even to tolerate any other. This Covenant was sent into every village, and every man was expected to swear and sign it. As will be seen presently under his own hand, Mr. Crooke was one of those who did so.

At the commencement of the war, Somerset kept fairly free from any enemy, and was willingly obedient to all votes and orders of the Parliament. But after the great drawn fight on Lansdown, on the 5th July, 1643, followed in a few days by the absolute royalist victory on Roundway, near Devizes, the whole county was brought under the power of the king, was quickly occupied by his forces, and his majesty at once issued a Commission for reducing to obedience all his opponents in the west.

On Thursday, the 21st September, the Commissioners favoured Wrington with their notice, and Mr. Samuel Crooke was compelled to appear before them. The result of the interview was that he found it necessary to submit to the powers that were, and as a testimony of his new obedience he openly subscribed the following Eight Articles :—

- 1.—That all armes taken up by the Subject against the King, including the person as well as His power, is unlawfull.

* Antho.

- 2.—That I have alwaies abhorred the defacing of Churches and Images and the contemning and defacing the Common Prayer Booke.
- 3.—That I have alwaies disliked the indeavours of the Houses of Parliament for a separation from the Religion established in the Church of England.
- 4.—That I am sorry for any words let fall by me in Sermons and discourse, whereby it might be collected I should advance the Parliament designs in taking up armes or maintaining of Warre against the King.
- 5.—That I will make a Sermon in the Cathedral Church of Wells, at what time limited, testifying these particulars and another at Wrington.
- 6.—That I doe acknowledge the protestation made by the King, dated 16th October, 1642, to be lawfull in every particular and have taken it accordingly.
- 7.—That I will henceforth preach and encourage my parishioners in their allegiance to His Majesty, in their active and passive obedience.
- 8.—That I subscribe my name unto these particulars without any equivocation or mentall reservation whatsoever.*

SAM. CROOKE, Rectour of Wrington.

This submission was published by the King's party as a "pregnant instance" that the very men who were "prime instruments to seduce those parts, through shame, and conviction of the horror of rebellion," now desired to be admitted to His Majesty's protection.

Mr. Croke was further advised that instead of being a "Bedlam Rebell," and preaching nonsense and blasphemy, he had better inform all "wel meaning folke," who may have been drawn from their obedience, that their "strictest" leaders would in like manner confess their guilt and follow his example, if they

* Mercurius Aulicus, 27th Sept., 1643.

were "put to it" and called upon to do so. Royalist soldiers were now quartered upon him, "bloody minded, dangerous ruffians," who tyrannised over him in his own house, not permitting him quietly to enjoy himself, even in his own private study. When he retired there, as he was often obliged to do, to escape from their insolence, they frequently pursued him with drawn swords, vowing his instant death for not more fully complying with their wishes.

But when the submission became known in London, early in October, the astonishment and vexation were great amongst his own party. In the account sent to the Royalist quarters at Oxford, the Commissioners called him Rector of Wrington. Look! cried his old friends, they now call him Rector of Wrington; had not he subscribed, he had been "plain Craftsman or Presbyter, or Croke, the Coachman." Master Croke, adds the chronicler, "I would your late cousin, Judge Croke,* were alive, either to counsell or condemn you." Then noticing the Fifth Article, which promised two sermons, one at Wells, the other at Wrington, he adds, "be sure and take heed first, Master Croke, that these places be far enough from the Parliament Armies."† In November there appeared a feeble attempted refutation of this story, which stated that Master Croke absolutely denied it, and "protested his innocency in that particular, and had ample testimonies" of his taking part with the Parliament.‡

That he deeply regretted being compelled to this act may well be believed. Refusal to submit was certain deprivation, possibly some painful imprisonment; and only the hope that others would be induced to follow his example, and that his great influence may be used on the King's side could have got him off so easily. In judging his conduct, it must be remembered, too, that he was now seventy years of age, a time when the desire to die Rector of Wrington might well be strong upon him.

* (?) Sir Geo. Croke, of Waterstoke, Bucks, Deed. 1641, Athens, Oxon.

† *Mercurius Britannicus*, No. 7. ‡ *Mercurius Civiens*, No. 25.

The Prayer Book and surplice were thus again brought into use at Wrington, and so affairs remained through 1644, and until the great victories of Sir Thomas Fairfax, in 1645, once more restored Somersetshire to the Parliament. The King being then beaten everywhere, was soon without an army strong enough to cause anxiety, and the attention of the Parliament was busily turned to the completion of the Presbyterian Establishment.

A new Assembly of Divines was called, but Mr. Crooke was not now one of the Members for Somerset; Mr. Humphry Chambers, of Claverton, being appointed in his stead. The Parliament took care, nevertheless, to retain the entire management of all Church affairs, and from this cause the new system adopted was allowed to remain incomplete. No Presbyteries were created, by which vacancies in the Assembly could be filled up, until some time in the year 1648, when the county of Somerset was made a "Province" in itself, and for the "better settling the Presbyterial Government," was divided into nine *Classes*, or districts, of which nine Bath and Wrington were two.* But as there were not "fitting members" enough, these nine were reduced to four, and Bath and Wrington were united. The boundary of this united district extended from Axmouth across by Chilcompton to Brackley, on the borders of Wiltshire, and included a hundred and forty-one parishes and hamlets. To superintend this large part of the county there were eleven Ministers only appointed, besides those for the City of Bath, and the first named on the list is Mr. Samuel Crooke de Wrington. Besides the Ministers there were thirty-two Elders, and amongst them were John Amery and Edmund Keene, of Wrington.

This "long looked for" settling, came however, too late, for besides that many were tired of the Parliamentary dictation, there had now arisen that "Great Goliath," Cromwell, and with him the Independent party, "Dissenting Brethren" as they were

* The County of Somerset Divided, &c.

called. Mr. Crooke was much troubled with these "Dissenters," "silly seduced ones" who were carried away with a spirit of giddiness,"* and who with all his endeavours and affectionate essays he failed to reclaim. Advancing age rendered him less able than formerly to cope with this new trouble. He now often suffered from lowness of spirits, and imagining the approach of death several times preached his own funeral sermon. He also took a dislike to hearing himself praised or his parish highly spoken of, for the reason that he feared the then state of things would not last.

Unable to check the increasing influence of these "silly seduced ones," and being pledged against toleration, he joined in 1648, five-and-forty others, ministers of the Gospel in the county of Somerset, "brethren and companions in tribulation and in the kingdom and patience of Jesus Christ," in an Attestation sent up to the Parliament; in which he declared himself "deeply sensible of and heartily sorrowful for the high innovation" of the errors, heresies, and toleration of the times, and the slighting and vilifying that Solemn League and Covenant, which had laid upon him the "greatest ingagement and endeavours for their extirpation."*

This was his last public act, but he continued to study and to preach as long as his strength enabled him. He constantly preached, if at all in health, three times a week, and when illness came upon him, and his physician told him if he would preach more seldom he would live the longer, he answered, "Alas! if I may not labour I cannot live, what good will life do me if I be hindered from the end of living."† His last sickness, which caused him much suffering, and was full of "biting pains," he bore with patience, and died after forty-seven years' residence at Wrington, on the 25th December, 1649, aged seventy-five all but one month, leaving a widow, but no family surviving.

* Attestation of the Ministers of Somerset, &c.

† A Collection of Lives, &c.

His last sermon was preached on the 16th October, from Rom. viii. 16, and his last ministerial duty was the baptizing two children privately, he being too unwell to get to the church. On his illness becoming known there was regret everywhere, and at his death "great lamentation and mourning." His funeral on the 3rd January, 1650, was an extraordinary one. A crowd of gentlemen and ministers stood about his hearse in tears, all striving to outmourn each other, and who should honour him most by bearing his body to the "bed of rest." The church was crammed with the greatest number ever got into it, and many hundreds remained outside unable to gain admission. The usual exhortation was delivered by his friend and neighbour, Mr. William Thomas, pastor at Ubley.

So passed away "this singular servant of God," not, however, to be at once forgotten, for on the 12th August, 1652, Mr. John Chetwinde, pastor at Wells, preached a Commemorative Sermon, entitled the Dead Speaking, &c., from Zech. i. 56. This was dedicated to the Worshipful John Hipsley, of Emborough, and John Buckland, of West Harptree, Esquires, and their "vertuous comforts."

During his forty-seven years' labour, he preached 7,000 sermons, and his style became the model for, and was imitated by other ministers. Instead of giving much learning and a "weak" sermon, he preached plainly and profitably, avoiding new and affected words or uncouth far-fetched notions.* He always brought new matter into the pulpit, not like many "setting on always the same dishes with a little new garnish, even to nauseousness." His expressions were described as "choice, solid, savoury and seasonable," his applications "home and pertinent," his eloquence and elocution "sweet and moving."† Such an "opening and warming" of his hearers' hearts before the sermon,

* An Exhortation, &c.

† Antho.

and after the preaching "such a sweet closing up of all." He was thus always "full of power in God's House," and also "profitable" in his own as well as other men's.

In manner he was grave without austerity, pleasant without levity, courteous without hypocrisy, and charitable almost without an equal.*

From the parish registers it is found that at this time a rent was paid for the pews or seats in Wrinton Church, a judicious proceeding, when so many strangers flocked to hear the great preacher, the renowned "magazine of piety, and most accomplished and triumphant servant of Jesus Christ." But besides this the people of Wrinton, "did him right" in the matter of maintenance, and paid him their tithe, when it was withheld from all his neighbours, at a time when even the sound of the word was hateful, so that being a "lover of hospitality," being "willing of himself," and made "able" by his parishioners, he saw much company. Having excellent and "acute parts" and much wit, he was merry at table, yet free from "unworthy or empty" discourse. Few men could draw after them so much affection and admiration.

On the 4th of Dec., 1648, he was nominated to the less valuable Vicarage of Bouby (Boothby), in Lincolnshire, void by death,† and apparently refused it, as another was appointed a few days afterwards. He had at other times been offered promotion, with "accessories" of maintenance and honour, but had always declined to leave his beloved Wrinton.

His monument or tablet in the chancel of his Church‡ records the death of his mourning widow, in 1658, and tells also that there are deposited the remains of this faithful unwearied pastor, this priceless and venerable man.

* Brook's Lives.

† Lords Journals, vol. 10.

‡ Collinson.

WILL OF TOBIAS VENNER, M.D.

(Communicated to the Club by Dr. Hunter, 11th Feb., 1874.)

In the name of God Amen I Tobias Venner of the Cittie of Bathe in the Countie of Somerset Doctour of Physicke beinge of perfect memorie and understanding doe ordaine and make this my last Will and Testament in manner followinge. Imprimis I bequeathe my soule into the hands of Almighty God my only Saviour and redeemer and my body unto Christian buriall in the Church of Peter and Paule in Bathe. It. I give to my servant Elizabeth Parker my silver bason and ewer. It. I give to her sister Mary Parker fiftie pounds of Lawfull English monie. It. I give to Henry Parker the sonne of Henry Parker apothecary one hundred pounds, alloe I give to him my silver piped Cup and guilt Boll, and to his mother Anne Parker my dish of mother of Perle and guilt spoone. It. I give to Tobias Mills the son of Arthur Mills deceased fiftie shillings and to his sister Anne Mills fiftie shillings. It. I forgive to Ralph Bowy sixe pounds that he oweth to mee. It. I give to John Bowy the sonne of Ralph Bowy five pounds. It. I forgive unto James Murford fortie shillings that he oweth mee. It. I give to the poore of Bathe Twentie pounds, Tenne pounds wereof to be distributed at thaire houses the day after my funerall at the discretion of Mr. Henry Parker, and the other Tenne pounds uppon the same day month after followinge, as for the rest of all my goods and chattles whatsoever not before given and bequethed I give and bequethe to Elizabeth Parker aforesaide whome I make the sole executrix of this my last will and testament to see these my legacies discharged. In witnesse whereof I have hereunto set my hand and seale the one and twentieth day of January Anno Dom. 1659.

TOBIAS VENNER.

Wittnesses hereunto are

Benjamin Gostlett,

Henry Parker,

John Pyncombe,

See Britton's Bath Abbey for an account of Dr. Venner, compiled from Guidott and others. The copy of the Will is among the evidences of the family of Parker of Bath and Wildcombe, in the possession of Mr. H. E. Howse.

Copy of a Letter from Mr. Stephens, of Camerton, near Bath, to Mr. Davis, of Longleat, on the subject of Diseases of Wheat, dated August 22nd, 1800. With Remarks by the Rev. LEONARD BLOMEFIELD, M.A., F.L.S., F.G.S., &c., President.

(Read March 12th, 1873.)

" I have examined my Botanical Books for information concerning the blighted wheat you put into my hands at Wells. The specimen agrees so exactly with the Plate in Sowerby's Fungi, No. 140, that there cannot remain a doubt upon the subject. In the Letterpress he states it to be 'Uredo Frumenti,' a new genus of Fungus detected by Persoon (whose work I have not got) and of which there are several species. Mr. Lambert (a very sagacious Botanist) has given to the world a paper on this Fungus, in the Transactions of the Linnean Society, and which he names as before cited 'Uredo Frumenti.' He seems to indicate this disease in wheat as very prevalent in the West of England, and particularly about Warminster, and that it comes on particularly after rain, but that it has not been known above 12 or 14 years,* with some other observations wishing the attention of persons more skilled in Agriculture to this important point.

" Yet the staff of life is attacked also in another formidable way by Insects breeding in the parts of flowering, and which destroy, or rather lessen the pollen so necessary to the fructification that the grain becomes more or less affected, and which I take to be the cause of those shrivelled, diminutive grains you showed me. Indeed the very intelligent letters of Mr. Marsham and Mr. Kirby in the Linnean Transactions exhibit to mankind a perfectly new account of this malady, and the proofs appear equally strong with the facts.

* " Mr. S. is not quite correct in point of time. This disorder has been noticed for a much longer period, under the name of Rust or Mildew, but it has certainly increased very seriously of late years."—T. D.

" It seems to me, therefore, that the first is a disease of the plant originally, or superinduced by such weather as usually produces the Fungus tribe. But the affair of the insects is clearly an Ordinance of Nature not to be resisted.

" I should be happy if anything I have said should lead your active mind to further discoveries on the subject.

" Yours, &c., &c.,

" JAS. STEPHENS.

" 22nd Aug., 1800."

Mr. Davis's Remarks on Mr. Stephens's Letter.

" The shrivelled, diminutive grains of wheat shown to Mr. S. were occasioned by the *blight*, and *not by insects*.

" The effect of the blight, or rust, or mildew, as it is variously called in different countries, and which is clearly the 'Uredo Frumenti' Fungus, is to stop the circulation of the sap in the wheat straw, when the grain is in a milky state, in consequence of which the grains cease to fill and become shrivelled, thin and light. But it is clear that the impregnation is complete before this effect operates, as the grain is equally good *for seed* as the most perfect wheat, although the quantity of flour therein is so much reduced that it is scarcely fit for anything but chickens' meat. The only remedy, and that a partial one, is to cut the wheat very green (as soon as the disease appears), and lay it on the ground to receive moisture from the dews for eight or ten days. The straw also is not only rendered *black*, but is so brittle as to be of very little value.

" As to the Insects, Mr. S. is not quite correct. The disease is certainly frequent, but not in any degree so injurious to wheat as the Blight. They are generally found in ears of wheat where some blossoms have been rendered *abortive* by *frost*. The stamina of the flowers die in the husk, and the anthers, together with the rudiment of the grain, becoming

“putrid, a particular kind of fly blows its maggots in them. These maggots sometimes, but not often, eat the adjoining grains, in the manner the weevil does in granaries—perhaps it may be the same insect. But this injury is not very serious, as the blossom being already abortive, there could be no grains in those husks, and it seldom happens that above three or four grains in an ear, and not one ear in a hundred, are thus injured. The shrivelled grains are entirely the effect of the fungus, and not of the insects, as I have since explained to Mr. Stephens.

“This fungus certainly appears after slight misty rains, which I suppose enables the seed (probably flying about in the air) to fix on the straw, for it always appears in currents through a field, as if brought by the air. The best cause assigned for it is sowing too late, or on exhausted land, where wheat cannot find good foothold, the *sine qua non* of a wheat crop. Such crops are always the most affected by it, although the best husbandry cannot always prevent it.

“It is a most serious evil, and seems to get more and more so every year. In this year (1800) many crops of wheat have been reduced from a fair prospect of 40 bushels per acre, to 15 and some to 12, and at the same time the grain reduced at least one-third in its value.

“THOS. DAVIS.”

“It is a very singular but well ascertained fact, that a Barberry Bush in a wheat field will produce an effect very similar to the Blight, without any appearance of Fungus on the straw.”

Remarks on Messrs. Stephens and Davis's Letters. By the REV. L. BLOMEFIELD.

These letters came into my hands, along with other papers, books, &c., from the Rev. L. Chappelow, my great-uncle, in the year 1820, in which he died. He was a good naturalist and botanist, and his books formed the nucleus of the “Jenyns

Library" now in the Bath Literary and Scientific Institution. He had been formerly, I believe, tutor to the then Marquis of Bath, and was often a visitor at Longleat. This renders it probable that he got the copy of Mr. Stephens's letter from Mr. Davis himself, who may have been a steward or agent connected with the management of the Longleat property. Mr. Stephens, of Camerton, is quite unknown to me; but he seems to have been a botanist whom Mr. Davis had consulted in reference to the subject to which the letter relates.

The letter, with Mr. Davis's remarks on it, has not merely a local interest. It is instructive, as coming from one who was well acquainted with what had been written by others on the diseases of corn up to that time; while the remarks of Mr. Davis are those of a clear-headed practical agriculturist, as well as a close observer; and, taken both together, they enable us to judge of the advance made in our knowledge of wheat diseases since the period of their date, the last year of the last century.

Two distinct sources of disease in wheat are spoken of by Mr. Stephens—one he calls "blight," due to fungus growth; the other caused by insects, as he imagines; though in the particular case of the "shrivelled diminutive grain" shown to him by Mr. Davis, the latter considers this also due to blight.

Fungi, their history, structure and mode of development, were comparatively little understood in those days, and the species not accurately distinguished. Several others are known to attack corn besides the one Mr. Stephens alludes to, which has been called by the different names of *rust*, *mildew* and *blight*; the latter word being one to which no very definite meaning can be attached—being often used indiscriminately for maladies in plants arising from very different causes.

A good account of the *rust* or *mildew*, which in fact are the names of two different stages of the same species of fungus (spots of a rust-coloured dust being the immature form of mildew which appears in dark or black streaks) will be found in a pamphlet

published by Sir Joseph Banks in 1805. In this tract will be found very accurate and highly magnified figures of this fungus in various stages of growth, as it appears on the straw of wheat, delineated by Bauer, who was the first botanical draughtsman of that day.

Mildew is much more prevalent some seasons than others. The alarming deficiency which it caused in the yield of wheat, in the harvest of 1804, was the cause of Sir Joseph Banks taking up the subject, and publishing the year following the tract just alluded to. The spores of the fungus, by which mildew is caused, are present all years and generally diffused ; but to what extent they are developed, and whether so far as to be productive of any serious mischief, probably depends upon seasonal influences (like the potato disease, also due to the growth and spread of a small species of fungus), combined with peculiar conditions of soil, and the state of the wheat plant itself at the particular time when the germination of the fungus takes place. Both Mr. Stephens and Mr. Davis speak of its coming on after rain ; and that it abounds most in wet summers, to the especial prejudice of corn that has been much laid by wind and rain together, is what I suppose all agriculturists would allow.

At the conclusion of Mr. Davis's remarks, reference will be found to what he terms "a very singular but well ascertained fact, viz., that a berberry bush in a wheat field will produce an effect very similar to the blight, without any appearance of fungus on the straw." The latter part of this statement I doubt being correct ; but the circumstance of the connection between mildew and a berberry bush is a very curious one, and all the more so from this apparent anomaly having been only within the last few years cleared up ; if, indeed, it be yet quite cleared up. It has been over and over again asserted that such a connection does exist, however it may be explained, and over and over again as stoutly denied. The supposed connection was grounded upon no end of cases brought forward, in which the mildew upon the

wheat was to all appearance due to the presence of some berberry bush in close proximity to the field in which the wheat was grown. The denial of such connection was based upon the fact—that, though there was a fungus very common upon the leaves of the berberry, which in its young state bore some resemblance to the rust of wheat, in its adult state that fungus presented a totally different character from mildew, and belonged to quite a distinct genus. Botanists generally maintained this last opinion till very recently ; notwithstanding, the belief in the injurious effect of a berberry bush on wheat has remained unshaken with a large class of farmers for more than a hundred years back. One of the most decided instances on record in support of such belief, is mentioned in the first volume of the periodical “Nature,” published in 1870. It has reference to the conduct of a railway company in the south of France, the notice being taken from the “Bulletin de la Société botanique de France,” for January that same year :—

“In the commune of Genlis, department of Côte-d’Or, a berberry hedge was not long since planted on one of the railway embankments ; when immediately the crops of wheat, rye, and barley in the neighbourhood became infested with rust. The complaints of the farmers caused the appointment by the company of a commission to investigate the subject, who reported, after a full inquiry, that wherever the berberry was planted the cereals were more or less attacked by rust ; where they were absent, the crops were free from the disease ; and that the planting of a single berberry bush was sufficient to produce the rust where it had never appeared before. The railway company’s own commission held that compensation was due from the company to the farmers.”

Nothing would seem to be clearer than the testimony afforded by this circumstance to the point in question.

The probable explanation of the mystery, so far as it can be accepted, is due to the better knowledge we have now respecting

the changes of form which many fungi undergo in their progress to maturity ; at the same time that they are capable of propagating themselves while immature, in cases in which the conditions for attaining to a higher growth do not exist. Since the discoveries of Steenstrup respecting the alternation of generation among the lowest forms of animals, the same phenomenon has been observed among the lowest forms of vegetables ; and it is now believed that there are whole tribes of fungi, hitherto considered distinct, which are but different phases of one another.

The circumstances of the mildew fungus are as follows :—It has been already stated that rust (*Uredo rubigo*, as it used to be called) and mildew (*Puccinia graminis*) are but two stages of the same plant, the former being an earlier form of the latter. This was clearly shown by the late Professor Henslow, in a paper published in the "Journal of the Royal Agricultural Society," in 1841 ; and indeed the idea has been taken up that the *Uredines* generally, of which there are a great variety, are all of them but first phases of the *Puccineæ*—these two genera being in this way brought together. With regard to mildew, however,—the *Puccinia graminis*—it has been now further ascertained that this fungus, as it appears on wheat, does not ordinarily reproduce itself ; but that, if the spores are sown on the leaves of the common berberry, they give rise to the well-known orange-coloured spots of *Æcidium berberidis*, formerly considered as a fungus belonging to an entirely different group. The spores of the *Æcidium*, on the other hand, do not reproduce the *Æcidium*, but the *Puccinia* in its rust form, showing the berberry fungus to be the third and last of a series of changes through which one and the same species passes before arriving at maturity ; and so explaining how the proximity of a berberry bush, where it exists, may cause mildew in wheat. But a seeming difficulty here presents itself : if the berberry fungus is the same as the mildew fungus, and the form which the latter finally assumes—supposing the conditions favourable—how do we explain the extremely common cases in which the wheat is still

mildewed, and to a very mischievous extent, though no berberry bush is near ; and when consequently the spores from which the mildew arose could not have derived their origin from the fungus of the berberry ? To explain this, Mr. Berkeley thinks it probable that, when the berberry is not at hand, the subsidiary rust spores, equally with the *Puccinia* itself, may have the property of reproducing the mildew ; the same mildew that attacks wheat being found on various grasses and reeds, such as grow in ditches and on the borders of fields—from which may arise a plentiful supply of spores—and the parasite, in this way, be propagated season after season *without the *Æcidoid* form intervening*. There are other cases analogous to this, Mr. Berkeley observes, in the vegetable kingdom ; and so there are also in the animal kingdom ; in this last may be mentioned especially the case of a small gnat, the larvæ of which, according to recent discovery, give birth to other larvæ, and these again to others for several generations, without the mature winged state being previously attained.*

I now pass on to the second disease in wheat spoken of by Mr. Stephens caused by insects. There are several different species of insects that attack corn ; but the insect here referred to, both by Mr. Stephens and Mr. Davis, is in all probability the *wheat midge*, whose history was so closely investigated by the late Professor Henslow, forming the subject of another communication by him to the “ Journal of the Royal Agricultural Society,” in 1842. The wheat midge is a minute two-winged fly, that “ may be seen in myriads in the early part of June, between seven and nine o'clock in the evening, flying about the wheat for the purpose of depositing its eggs within the blossoms. From these eggs are hatched small yellow maggots, the larvæ or caterpillars of this fly ; and by these the mischief is occasioned.”

It has not been exactly ascertained on what part of the flower

* See two articles in *Nature*, vol. i., p. 516, and vol. ii., p. 318, from which much of what has been said above is taken.

these maggots feed ; “ but in some way they cause the non-development or abortion of the ovary, so that the grain never advances beyond the state in which it appears at the time the flower first expands.” The damage done to crops of wheat in some seasons by this insect is very great. In one instance recorded, the loss occasioned by its attacks in the late-sown wheats is supposed to have amounted to one-third of the crop. Some of the larvæ, when about to pass into the pupa or chrysalis state, quit the ears and fall to the ground, where they probably remain buried till their final metamorphosis takes place. But the greater number of the larvæ attach themselves to a sound grain, or to the inside of one of the chaff-scales, a circumstance leading to the belief that “ great multitudes of them might easily be destroyed by burning or scalding the chaff after the grain has been thrashed out.” And this is the recommendation of Professor Henslow—surely worth every farmer’s knowing and trying, as a means of lessening the evil, notwithstanding the summary way in which Mr. Stephens, at the conclusion of his letter to Mr. Davis, dismisses the “ affair of the insects as clearly an ordinance of Nature not to be resisted.”

*Tumulus at Nempnett, now destroyed. By the Rev. Preb. SCARTH.
(Read 13th May, 1873.)*

An account of this Tumulus is given in the *Gen. Mag.* for 1789. This was communicated by the Rev. Thos. Bere, Rector of Butcombe; the length is given from N. to S. 150 feet, and from E. to W. 76 feet. It was known by the name of Fairy’s Toot. The Waywarden of the parish being in want of stones for the road began to cart it away, and this led to the discovery of the internal chambers. The construction appears to have resembled that at Wellow, but the central passage reached the entire length of the Tumulus, and had cells on each side.

This avenue was closed by a perforated stone 13 feet N. from the entrance. The walls of the passage were constructed like those at Wellow of slabs of stone of considerable size, and the interstices filled with dry walling. The outer circuit of the Barrow was probably like that at Wellow finished off with dry walling, and the whole coated with earth. The entire length of the passage and the cells were covered at the top with horizontal slabs. Unfortunately this Tumulus was not so carefully described and planned by Mr. Bere, as that at Wellow by the Rev. J. Skinner, and the same interest was not felt at that time in the preservation of pre-historic monuments. It is much to be regretted that a careful plan and exact measurement were not made of the Tumulus in its perfect state, and the size of the slab-stones of which the chambers were composed correctly ascertained. Collinson in his *History of Somerset* (*vol. ii. p. 318*), makes mention of this Tumulus as situated on the borders of Nempnett or Nemnet and of Butcombe parishes, but standing in the former at a short distance from the parish church, and covered with briars and thick shrubs.* This account in Collinson was probably communicated by Mr. Bere, as Collinson published his *History* in 1791 only two years after Mr. Bere's account appeared in the "*Gen. Mag.*," in 1789, or Collinson may have written it from personal inspection. We cannot but feel sorry that such a fine example of primitive sepulture should now be almost totally destroyed. A lime-kiln has been built on the site of it, and the stones of which it was composed burned into lime; also a fold-yard constructed at another point, and the stones used for walling! A very small portion still remains just to mark the original height of the side, and the dimensions may be ascertained by a careful inspection of the ground which indicates where the Barrow began to rise out of the level field; and the places from whence the earth has been brought for covering it are also discernible.

* See also "*Rutter's Somerset*" (published 1829) p. 124.

This Barrow was visited by our Club, July 17th, 1856, and a notice of it will be found in the proceedings of the Somerset Archæological and Natural History Society, for the year 1858 (*p.* 55.) It is also recorded by Mr. Sayer in his History of Bristol, but in its ruined condition has ceased to be of the interest it would have been, and which now attaches to all monuments of an early Celtic population. Very few examples remain in this island of structures of a similar kind. These are now beginning to be valued, and are receiving that attention which had it been bestowed upon them years ago would have saved many from wanton destruction, and have aided greatly in the elucidation of the manners and customs of our forefathers. The Nemnet Tumulus seems to have been as perfect when first discovered as that at Wellow. This was happily preserved from neglect, and probably from destruction, by the exertions of this Field Club. Within the last twenty years Tumuli of a similar construction, though less perfect, have been opened and examined in Gloucestershire. The Tumulus at Uley, which was visited by this Club, is sufficiently known, having been so well described by Dr. Thurnam in the proceedings of the Archæological Institute. When that interesting relic was visited three years ago by this Club it was found to have been wantonly injured above the capstone of the entrance, and unless attention has been paid to replacing the stones it must soon become a mass of ruins. The attention of the Cotteswold Field Club was called to this at the time, as it more naturally came under their province, to arrest, if possible, the work of demolition, but I have not heard what result has followed the effort of our Club to preserve from destruction another of these ancient sepulchres.

A Tumulus of similar construction was opened and examined at Rodmarton, by the Rev. S. Lysons, F.S.A. An account of this will be found in the "Proceedings of the Society of Anti-quaries, June 4, 1864," in the plan and drawings, and also in a work entitled "Our British Ancestors," (*p.* 136), by the same

gentleman. This tumulus presented features similar to the Nemnet Tumulus, but was much less perfect in its internal construction; only two chambers were found in different parts of the Barrow, but the dry walling was similar.

A Tumulus near Nympsfield was also opened 1862 by the Cotteswold Club, and has been described by the President of that Society, Sir W. V. Guise, Bart. The form and arrangement of this Tumulus was similar to that of Uley, and the contents were similar also.

In 1864 another Tumulus of like construction was opened at Ablington, in Gloucestershire, and formed an elongated oval 270 feet long by 100 feet wide, and 12 feet high. It stands N. N.E. at the larger end, and is built of oolite stone covered with soil and turf. This was surrounded with an outer wall of dry masonry like that at Wellow, and had an entrance of like construction.

The chambered Tumuli in Wiltshire have had the attention of the late Dr. Thurnam, who has carefully recorded their construction and their contents, and given drawings of the chambers in his papers in the "*Archæologia*" (*see vols. xxxviii. and xlii.*), as well as in the "*Wilts Arch. Mag.*" (*see vol. iii. p. 164*); but it would occupy too much time to dwell upon the peculiarities of these Barrows; they are chambered, but the chambers differ from those in Somerset and Gloucestershire.

The chambered Tumuli for which Brittany is noted, have happily received from the Rev. W. C. Lukis very careful examination, and he has carefully classified and arranged them in a paper read to the Archæological Association, in September, 1866, and printed in their proceedings for that year. He has there given plans of the different arrangements of the chambers to be found within Brittany and in this Island, and also in Jersey. Archæology owes much to his labours as these have been conducted with great pains and careful observation. He considers that the round Barrows were lengthened into long Barrows by

the addition of fresh chambers, and gives an instance of this (*see Jour. Arch. Ass.*, 1866, p. 253). Chambers seem to have been formed as occasion demanded, and the Barrow adapted to the size of the chamber.

Mr. Fergusson in his elaborate work on "Rude Stone Monuments," wishes to show that these Tumuli are of much more recent formation than is generally supposed. He has with great pains brought together examples from many countries, and argues this point with considerable ability, but in a recent paper read by Mr. Lukis to the Society of Antiquaries, he has pointed out some of the errors into which Mr. Fergusson has fallen. It is not for us to attempt to decide such questions, but rather, as a club, to gather up materials from which just conclusions may eventually be drawn. It is the duty of a body like ours to call attention to the value of existing prehistoric remains, and to prevent their destruction, if possible, and to point out the need of their preservation, and the interest which attaches to their history. Such monuments as the Nempnett Tumulus are destroyed through ignorance of their true value, and of the use which may be made of them. The spots of land on which they stand not unfrequently fall into the possession of persons quite unable to comprehend their value or importance, and for the sake of a little temporary gain a record of past ages is ruined irretrievably! This can hardly be otherwise when the owner is of humble rank and little education, but we might hope better things of men who are supposed to possess a higher education. What shall we say of a building company which has lately consigned to utter destruction one of the most important and interesting historical monuments of this neighbourhood? I mean the camp on the Somerset side of the river Avon, called Bowre Walls, and opposite the camp on Clifton Down. This has been almost obliterated for the sake of the material of which the ramparts of the camp were composed, and which has been used in making roads! How much better to have preserved these ramparts entire, and have made them a part

of the ornamental garden attached to the new villas erected on the heights over the Avon, and so associated the marks of ancient warfare with the elegancies of modern civilisation. Surely it is necessary that some power should be given to prevent the monuments of past ages being wantonly destroyed, and we must be thankful that the subject has lately been brought under the consideration of Parliament.

A Sketch of the History of Butcombe, with some particulars respecting the Church and Parish. By the Rev. W. H. CARTWRIGHT, M.A., Rector of the Parish.

(Read May 13th, 1873.)

Butcombe is a parish in the Hundred of Hartcliffe and Bedminster, in the County of Somerset ; 3 miles from Wrington, and 9 from Bristol, in the Axbridge Union, from which place it is also about the same distance. It contains 999 acres of land, extending W. by N.E., from the River Yeo to Broadfield Down, or rather that part of it now called Felton Common. It is long and narrow, being about four miles in length, and scarcely anywhere exceeding half-a-mile in breadth, and has scattered over it many detached portions of the Tything of Regilbury, which is part of the adjoining parish of Blagdon. It is bounded by the parishes of Wrington, Blagdon, Nempnett and Winford, and contains about 230 inhabitants.

The Manor,—besides the Manor of Butcombe (proper) there are parts of at least two other manors in this parish, viz., those of Thrubwell and Aldwick. The chief part of the former of these with its Manor House being in the parish of Nempnett, and of the latter with its Court House in the parish of Blagdon.

The Manor of Butcombe (proper) seems to have gone with the Advowson of the Rectory up to a comparatively late period ; we will therefore for the present take them together, and in

speaking of them and of the Manor of Butcombe Thrubwell, I think I cannot do better than use, for the most part, the words of Mr. Bere one of my predecessors, as recorded by him in one of our Parish Registers ; wherein, by his lively sallies, he has rendered amusing what might to some have appeared a matter of dry legal or historical detail. "Butcombe, he says, is thus entered in Domesday Book."—"Fulcran holds of the Bishop Budcombe. Edward held it in the time of King Edward, and it gelded for 3 hides. The arable is 3 Carucates. The demesne is one Carucate and two servants and eleven villans and four cottagers, with five ploughs. There is a mill of twenty pence rent, and ten acres of meadow, and thirty acres of wood. It was and is worth four pounds per annum."

"This Bishop, of whom Fulcran held Budcombe, was Geoffrey of Coutances, a Norman by birth. He was elected Bishop of Lincoln, A.D. 1048. On the invasion of this kingdom by William Duke of Normandy, in October, 1066—this son of violence, a bishop ! joined his countrymen, the Bastard, at Pevensey—and so wielded his spiritual, or rather carnal weapons, at the deadly Battle of Hastings which bestowed on William the title of Conqueror, and the Crown of England, that, for his services (which from his remuneration must have been pretty considerable) he received from William 280 Lordships in England—was made Chief Justiciary of Ireland—and President of the great trial held at the County Court of Kent at Tenterden, between Lanfranc, Archbishop of Canterbury, and Odo Bishop of Baieux. We find him in the year 1070, denominated by Ordericus Vitalis, *Magister Militum*. In 1074, he marched with the other fighting Bishop Odo, to suppress what these pious, modest, Norman Bishops were pleased to call a rebellion, into which the poor people maddened by vile oppression were driven. The natives, under the command of the Earls of Hereford and Norfolk, were defeated with great slaughter.

Bishop Geoffrey then detached his forces from those of Odo,

and with great rapidity marched up to, and in a bloody battle defeated the army of the west Saxons, which was then besieging Montacute in the County of Somerset. In 1079 he appears a very active member of the great National Council held in Saint Paul's Church, London. In 1087 he attended the funeral of William his most munificent patron. Soon after he and Bishop Odo, (ah ! precious pair !) contrived to conjure up a rebellion in Normandy against William Rufus ; but by extreme activity William defeated the laudable designs of these peaceable prelates, and Geoffrey, with his friend Robert de Mowbray, fled over to England, and fortified the Castle of Bristol for the most honourable purpose, as the Saxon Chronicle thus records ; " Bishop Godfrey and Robert, a disturber of the peace, went to Brigstowe, and committed spoils, and brought their booty into the Castle." Radulphus de Diceto calls the Castle the Bishop's Castle, " In suo castello Bristow"—but he was in this mistaken, Godfrey was warden only. However his looting and spoiling in the neighbourhood rendered even the Castle of Bristowe an unsafe place for his sacred person, so he fled thence privately back to Normandy, where he ended his pastoral cares and temporal concerns in the year 1093."

" In consideration of this last, and indeed in remembrance of sundry other political freaks and military frolics, King William seized honest Geoffrey's Manor of Budicombe (Thrubwell?) and bestowed it in the year 1094, on Walter de Budicombe, whose son Robert sold it, A.D. 1111, to De Mohun Lord of Dunster in Somersetshire. In this family it remained till the year 1200, when it passed in portion with the daughter of William de Mohun to Sir Richard Percival, of Weston in Gordano, Somerset. Sir Richard though a gallant warrior, was, it seems, in his latter days a little monkish ; for we find he granted to the Cisterian Abbey of Thame in Oxfordshire "a plough land in the Manor of Budicombe in pure and perpetual alms for the rebuilding a certain house there belonging to the Abbot and Convent." Sir Richard

seems to have made, as the times were, a pretty saving bargain with these cowed gentlemen, for he stipulated and obtained in lieu of his plough land, these valuable considerations :—"First, the prayers of the good monks for the welfare of King Henry son of John his Lord—and secondly, that all his predecessors and successors, he and they, shall be partakers of all the benefits and alms which had been made or should be made from the days of the Apostles to the end of time ;" and on these conditions "he willed the said plough land should be free of all secular service whatsoever." Sir Richard Percival must have been a very Jew to demand all the valuable requisitions he specifies for the paltry consideration of one plough land and that in Budicombe. John de Percival, Sir Richard's grandson, very generously (for there was no need, as Sir Richard had included him in the bargain with them) bestowed on the said Abbot and Convent "one yard land on the north side of the plough land given by Sir Richard," to be parker of their works of supererogation." This Deed bears date at Stowell, and was witnessed by Robert and Hugh brothers of said John de Percival, Robert de Chew, Edward de Bosco, Roger, John, and Asceline his sons, Master Thomas de Kene and others. In 1272, John, great-grandson of Peter le Sore, held this Manor of the Percivals by the sevice of half a Knight's Fee. The profits of the Manor were estimated at this period at two shillings."

"This Manor of the Percivals within the parish of Butcombe continued in the male line of that family till the time of King William the Third, when it devolved to Anne the sole daughter and heiress of Thomas Percival. Anne was twice married, first, to Evan Lloyd, of Salop, Esquire ; and after, to Thomas Salisbury, of Flintshire, Esquire. She at different times, in favour of her husbands, parted with her inheritance in the parish of Butcombe."

The Hospital of St. John in Redcliffe Putte, Bristol, founded by John Farceyne about 1260, became possessed of the Rectory

of Butcombe, and also a Manor (Butcombe proper ?) within this parish. A.D. 1358, when William Topsley was master of the said hospital, the Rectory and Manor continued vested in the brethren and sisters of Saint John, of the Order of Saint Augustine, Redcliffe Putte, Bristol, and so continued even till the fatal Statute of Dissolution. At that time on the resignation of Richard Broomfield, the last Abbot, King Henry the Eighth seized the Manor and Advowson ; and soon after, on the 29th of April, in the thirty-six year of his reign, A.D. 1545, he gave them to George Owen his physician. Owen, on the 3rd of June, 1547, sold them to John Bush, of Dulton in Wiltshire, whose brother Paul Bush, through the influence of Owen, King Henry made first Bishop of Bristol. The widow of John Bush married William Mann, of London, and so conveyed the Manor and Advowson to the family of the Manns. Francis, the grandson of William Mann, of Kidlington in Oxfordshire, sold both on the 29th of September, 1735, to Mr. Richard Plaister, whose grandson John Plaister, of Wrington, disposed of it to John Curtis, of Bristol, Esquire ; whose son John, when member for the City of Wells, sold it to John Savery, Esquire, of South Devon, who was originally seated at Shelston in that County, and there married Sarah Butler Clark, daughter and co-heiress of Peter Clark, merchant of Exeter ; and after her decease, married, at Walthamstow in Essex, Mary Towgood, on the 27th September, 1779, daughter of Matthew Towgood of the City of London banker. They then passed rapidly by purchase till in the early part of this century the Manor and Advowson seem to have been separated. The Manor still passed on by purchase till it became the property of Charles Gordon Ashley, Esquire, from whose estate it was purchased by George Coles, Esquire, merchant of Bristol, the present proprietor.

The Manor House, called Butcombe Court, which was burnt in the great rebellion, and was afterwards rebuilt, is a large square capacious mansion, with some fine rooms—some of which, how-

ever, are still in a ruinous state. It is enclosed within a small park bounded on all sides by four roads, and has an excellent walled garden which tells you that it has seen better days. The house is at present occupied by a farmer, the owner reserving some rooms to himself, which he uses as a residence occasionally in the summer season.

The Advowson—passing on as the Manor through several hands, was purchased in 1848 by the late Cornelius Cartwright, Esquire, of Dudley in Worcestershire, from whom it has come to his nephew the Rev. William Henry Cartwright the present Patron and Incumbent.

The living of Butcombe is a discharged Rectory in the Deanery of Chew (formerly Redcliffe and Bedminster), in the diocese of Bath and Wells. The Church is dedicated to St. Michael and all angels. It consists of a Nave and Chancel, North Chapel (recently added), and South Chapel and Lady Chapel on the south side of the Chancel.

“In the year 1484, says Mr. Bere, the Church of Butcombe was gorgeously ornamented, having all its windows exquisitely painted. There still remain (A.D. 1798), some beautiful pieces that somehow escaped Cromwell’s lambs, when for the love of God and honor of Holy Kirk they in pure zeal plundered and burnt the Manor House, and nearly demolished the Church. Among the pieces are the portraits of several of the monks in their sacerdotal habits—many roses—initials W.R., with brilliant rays of glory streaming from them—a Saint Peter and some other of the Apostles mutilated—a beautiful representation of the Sun in a dark blue sky. In the windows over the North Door is the figure of a human heart pierced with 3 nails. This was the cognizance of John Newland alias Nailheart, elected Abbot of St. Augustine’s, in Bristol, April 6th, 1481. His shield was thus blazoned—Argent, 3 nails, or, piercing superior a human heart, Val. Sang. This man was much employed by Henry the Seventh in foreign embassies. He died June 12th, 1515. He was much

patronised by William Canynges, the great Bristol Merchant. I suppose Abbot Nailheart to have been the donor of these costly embellishments.

When the present Rector came to Butcombe the Church was in a very decayed condition, and many years elapsed before he could see his way to effect, in any degree, its restoration. At last, some six years ago, he was enabled by the help of friends to begin the work ; and it was sufficiently advanced for Divine service to be resumed in the Church on the 22nd September, 1869. So decayed was the fabric from roof to foundation that, with the exception of the Tower and Lady Chapel, it was necessary to rebuild it. The restoration, however, is still incomplete, though it is gradually progressing, and we have hope that, some day, if it please God, and the funds can be obtained, it may again boast some of the grandeur which it possessed in the days of Abbot Nailheart. All the remains of the old stained glass have been collected and placed in the East Window of the Lady Chapel. The old roofs, which had been beautifully painted and gilded, had been concealed by plaster ceilings, erected apparently for the purpose of concealing the miserable state of the old timbers, which were so much decayed that it seems most providential that they did not fall upon the heads of the worshippers. They have now been restored—what was sound being retained, what was decayed being replaced by new timbers—as to mouldings and every other particular, except painting (which it is hoped may yet be accomplished), exactly in accordance with the patterns of the old. This remark will apply also to the new stone work in the Church, especially the arch of the north Chapel, that between the Chancel and Lady Chapel and the Chancel arch. In the Church, before the Restoration, there was not a Chancel arch, but the critical state of the Tower rendered it absolutely necessary to erect one for its support. In the east wall of the Lady Chapel is a niche, which was once, we may see, richly carved, painted and gilded ; but the face of which has been destroyed with axes

and hammers, the recess still existing, shewing the whole to have been out of a single stone, in which probably stood an image of the Virgin. Fragments of a small Altar and a Piscina, which seem to have belonged to this Chapel, were found buried in the floor at the west end of the Church ; and near to them, forming part of the flooring, so that the face was very much worn, was another and very large slab with mouldings similar to the other fragments, which is believed to have been the original stone altar of the old Church ; this has been repaired and reworked, and being placed on a strong wooden frame is now the altar of the present Church. There was also found in the floor a stone with a circular water drain, and round it a groove in which, probably, a much earlier font than the present one had stood. On the side of the window in the north wall of the Church, now the window of the north Chapel, were the broken pieces of a magnificent niche, which must have been, judging from the fragments, at least six feet high, elaborately carved and beautifully illuminated ; this had been knocked to pieces, and with the aid of slate, stones and plaster, made to form the eastern splay of the window. The whole of the fragments could not be found, or it would have been replaced. The remains of it now lie under the east wall of the Churchyard. The walls seem to have had upon them three dates of painting ; the first was a coarse fresco, of which little could be seen further than that there were many figures in which angels seemed to be part of the *Dramatis Personæ*, but nothing like a subject could be made out. The colours seemed to be chiefly flaming red and yellow, and the figures, etc., colossal. This appeared to have been covered with a coat of plaster and painted again, but nothing definite of this period could be traced. This had again been followed by a thin coat of plaster, of which little but portions of inscriptions in Roman letter could be made out. Among them, however, it was remarkable that along the north wall, facing the entrance by the south porch, there were parts of all three Creeds and of the Lord's Prayer. All of which

had been covered, from time to time, with coat upon coat of yellow and white wash.

The Village—of Butcombe is very picturesquely situated in a secluded nook in the long hill which forms the Southern escarpment of Broadfield Down, on a brawling brook which runs rapidly down to the River Yeo, of which it forms one of the most considerable tributaries, turning on its way, at the foot of the Village the Mill of which mention is made in Domesday Book. This brook is greatly increased in volume by two remarkable springs which have never been known to fail. One of these rises in the field behind the Church, the other in the Bristol Road above Yew Tree Batch, and is known as Cleeve's or Clive's Well ; this well is mentioned "in a Deed in 1360, by which Hathewisia daughter of the famous Gurney of the Court at Barrow, confirmed her father Robert's grant to Alexander de Budecombe of lands in Budecombe, near Clivewell, for his services in the fields of Cressy, 1346."

On the boundary between this parish and Nempnett, stand the remains of a large Tumulus or Barrow, stated by Collinson to be then (A.D. 1791), 60 yards in length, 20 in breadth and 15 in height, (now 1873, nearly obliterated), covered on the top with ash trees, briars and shrubs. *See Collinson, Vol. II. p. 318.* This is still (1873) called Butcombe Barrow, and by the villagers, "Fairy's Toot." But the grand mound here described by Collinson has all but disappeared. The ground on which it stood became the property of a farmer who planted a lime kiln upon it, which still exists, and literally burnt it into lime ; and the large stones which formed the roof and walls were carried away and used as covers for drains ; so that very little of the pile remains. A portion of one or two stones apparently standing edgewise may still be seen, and may be some part of the original structure. Some sheds and a small yard for cattle occupy a portion of the site of this stupendous and in a sense

once glorious work ; of which we may truly say "sic transit gloria mundi."

There are photographs by Batiste, of Bath, of the exterior and interior of the Church, and of the Rectory, which latter though modernised into a plain and unpretending structure is in reality of great antiquity probably coeval with the Church.

And here we will finish our notice of this retired and pretty parish, which not only possesses interest for the Archæologist, but would amply repay an ardent botanist or any other lover of nature who would care to expend upon it a summer day's ramble.

Ethandun (a narrative). By H. D. SKRINE.

(Read September 30th, 1873.)

On the north western slope of the Wiltshire downs is cut, clear and sharp, the outline in chalk of a White Horse. Far and wide it may be seen, and far and wide has been its fame as the well-known symbol of the great Alfred's victory of Ethandun, which, by one crushing blow, destroyed the power of the Danish invading host, and turned the enemy of England into its firm ally. It is true, nevertheless, that this view of the case has been of late years hotly disputed ; and some very clever papers suggesting other sites have been written. But there is one remarkable circumstance, that all the older, and I believe I may say, more learned Archæologists maintain this to be the site of the battle. Camden, Gibson, Gough, and last, not least, Sir Richard Colt Hoare, are very confident that Edington is Ethandun.

Let us take for our text, as all these writers have done, the words of Asser, the contemporary, friend and biographer of Alfred — "In the same year (878), after Easter, King Alfred with a few assistants constructed a fort in a place called Æthelinga-Egge, or the Island of the nobles, now Athelney, and from that fort harassed

the Pagans with attacks. At length, in the seventh week after Easter, he set out to Egbright Stone, which is on the *east* side of Selwood Forest, called in the Latin language "*Magna Silva*," and in the British '*Coit Maur*,' and there flocked to him all the inhabitants of Somersetshire and of Wiltshire, and all the inhabitants of Hampshire *who had not sailed beyond the sea for fear of the Pagans*. And when they beheld the King they very naturally received him with great tribulation as risen from the grave again, were filled with infinite joy, and there encamped for one night, and next morning they moved forward to a place called Eglea, and there encamped also for one night, and next morning moved forward to a place called Ethandun, where he attacked the Danes with a compact phalanx, and after a long and obstinate combat obtained a complete victory over them, routed them with immense slaughter, and pursued the fugitives to their entrenched camp, putting everyone to the sword whom he overtook. All that he found without the entrenchment he seized, men, horses and other cattle, but instantly put the men to death and boldly encamped at the entrance of the entrenchment with all his army; and when he had remained there fourteen [days, the Pagans, pinched with cold and hunger, and broken with terror and distraction, sued for peace, and offered to give the King what hostages he pleased without expecting any from him."

Such is the account given by Asser of the celebrated battle which decided the fortunes of Alfred. Of its correctness and authenticity, says John Britton, there can be no doubt as it is corroborated by all contemporary and succeeding writers. Different conclusions have, however, been drawn from this simple statement, and different sites have been identified with Ethandun.

Those who differ from the view which I am prepared to uphold, namely, that we have here the veritable Ethandun of Alfred, are, Milner, in his History of Winchester, who places the scene of action at Heddington, near Calne, and north of Round Way Down, and supposes Oldborough castle, near the road between

Calne and Marlborough, to be the entrenchment to which the Danes fled ; Lysons, in his *Magna Britannia*, would transplant it to Heddington in Berkshire, near Hungerford ; Whitaker, dissenting from these opinions, contends that it was fought near Yatton, in North Wilts, where he finds the name of "Slaughterford" a passage of the Avon near Chippenham. To make his case out he considers Highley Common in Melksham to be the Eglea of Asser, and finds the Danish stronghold in Bury Wood, between Colerne and Wraxall. This view has been also maintained by Dr. Thurnam and Mr. Powlett Scrope, in the "*Wilts Archæological Magazine*." It would take too long to discuss all the arguments in favour of these views. I shall content myself by stating as clearly as I can the arguments which have been advanced in favour of Edington, and the reasons which seem to militate against the other conjectures, availing myself of the papers published in the "*Wilts Archæological Magazine*," by Mr. Matcham and others.

The first argument in favour of Edington is its name, which certainly can fairly be considered to represent Ethandun, as it has differed very slightly in spelling, and the difference can be easily accounted for. Ethandun would, by a mere omission of a stroke to the second letter of the Saxon word, become Edandun ; and it is written Edendone in Domesday, and Edyndun as late as Henry VI. time, 1449. The present mode of spelling is of comparatively modern usage. Heddington near Calne was written with a "t" in Domesday, and its aspirate seems to show it to have been a different word. *Yatton* never had a "dun" or don attached to it in ancient documents, and is written "*Ettone*" in Domesday. It would be strange indeed if the memory of Alfred's victory fought at *Ettone-down*, as Dr. Thurnam and Whitaker imagine, could have been so forgotten that the "dun" should have fallen out of the word by the time of William the Norman.

Secondly—The old tradition which has for so many centuries linked the site of the battle to Edington is still preserved, and the White Horse is believed by the most learned Archæologists to be

of very great antiquity. There is indeed a story referred to by Whitaker of a Mr. Wise who in 1742 visited the spot, and said he had heard that the White Horse had been made by the men of Westbury of recent times to celebrate the place where their town revels were held. But Mr. Wise seems to have placed little credit in that version, for he says "yet still I think it may deserve enquiry of others how the common people were so fortunate in the choice of their ground, and whether they have not preserved the tradition of some older horse, and some older tradition, now forgot." And this is the view taken of the matter by Sir Richard Colt Hoare.

The third argument is the situation of the fortified camp of Bratton Castle, just above the Battlefield—and the distance from Brixton Deverill or Eggbright's stone—all agreeing admirably with the account of the battle in Asser and the Saxon Chronicle.

The late Rev. Arthur Fane in a paper on Edington, in the "Wilts Archæological Magazine," thus admirably describes its position. "The table land, which, dispersed in several groups, is called by the common name of Salisbury Plain, terminates from Westbury to the high road hanging over Earlstoke, in a series of ramparts of turf, which stand out against the Vale of Pewsey with the sheer massiveness of a fortified town. At no point does the upper plain rise more abruptly than where the down lands, forming a bason in which the little hamlet of Bratton is placed, sweep round to the north westward, and rise up almost perpendicularly from the vale of Pewsey below. Close under this natural rampart, a rich fringing of gigantic Elms and Walnuts surrounds the village of Edington, whose magnificent old Church startles the passer by with its almost Cathedral proportions and its rich outline of Pinnacle, Battlement and Tower.

Britton says the camp is of irregular form, humouring the slope of the hill. On one side, where the approach is easy, it is defended by double ramparts thirty-six feet high and a large out-work. The latter appears like a detached camp. On the

other side, where the ground is precipitous, it has only a single ditch and vallum, and at one spot it has no artificial defence. This encampment has two entrances in the area, S.E. towards the plain, and N.E. towards Edington, both defended by redoubts. The circuit of the vallum is 1540 yards, the general height of the ramparts 31 feet. The area is 23 acres. Outside the ramparts, on the S.W. declivity of the hill, is a figure of a White Horse cut from the surface in a walking attitude, 100 feet high from the hoof to the tip of the ear, and 100 feet from the ear to the tail. According to Gough, Camden and Gibson, it is an undoubted monument of the battle of Ethandun.

Doubts have been thrown on the identity of Bratton Castle with the stronghold of the Danes to which they retired after Ethandun, on account of there not being more than one entrance except from the south ; but this is in the face of facts, and there is no improbability in the Danes flying to it after the battle.

In order to enforce the argument from the nature of the ground I must take a brief general review of the history of the years 877-878, as given by Asser and other contemporary historians. Writers differ as to the position of affairs in the year 877. Some say that the Danes were, during that year, fiercely engaged in war with Alfred, and that he had fought so many battles with them that his people were both wasted and worsted. But it is asserted with more seeming authority by Turner, that that last year and some previous years had been a period of comparative peace and quiet, during which Alfred had contrived to alienate the minds of his subjects by his bad government. If the former supposition be true about the continued battles, which were generally victories over the Danes, we may ask how was it that Alfred was so suddenly overcome, his people stricken with panic and himself driven from the Royal Vill, of Chippenham, which was so girt with strong fortified posts, without a blow to the woods and marshes of West Somerset ?

If, however, the other supposition be true that Alfred had lost

the good opinion of his countrymen, that will explain everything.
The monarch

"Deserted at his utmost need
By those his former bounty fed,"

may well have felt his power collapse, and have seen no safety but in flight.

And what do the valiant men of Wessex do? They fly beyond the sea, or submit tamely to the Danes! We hear of the King, indeed, in Somerset, as fighting and harassing with a sort of guerilla warfare the triumphant enemy; but at the same time he must have been driven to great straits to have had to live on terms of equality with swineherds and to be set to turn their cakes on the fire.

All of a sudden, but it is after six or eight months of depression, Alfred appears again at Egbright's stone and unfurls his flag.

Then you hear of the men of Hampshire, Somerset and Wilts gathering round him overjoyed to receive their King amongst them again as one risen from the grave. Whatever of doubt or disaffection may have existed is now all removed, and he is surrounded by a loyal and determined band.

It is no time for halting now. He must burst upon the Danes with the same suddenness as they had sprung upon Chippenham. And where are they? Why, on the edge of the Wiltshire Downs, at a point from whence the greater part of Wiltshire could be observed and held in subjection; only some 15 miles in advance of Chippenham, where they may have left a garrison to support them by reinforcements, or cover their retreat into Mercia. Bratton Castle is their entrenched camp; a strong position made ready to their hands by the ancient inhabitants of the land. Those who could not be so well retained in the area of the fortifications are in the valley below Luckam or Low Combe Bottom, where is still a field called "Danesley." Here they would be sheltered by the sloping ridge of the hill, with a fine stream of water flowing beside their camp. Alfred has visited

the spot in disguise, so 'tis said ; at all events he knows that they are there, and that they are entirely unsuspecting of his approach, deeming themselves secure from any small predatory bands and expecting none other.

Some two or three miles, or less, from the Danish Camp skirts along the edge of the great Forest of Selwood, which has hitherto preserved Alfred and his followers from pursuit. Through this forest, from Egbright's stone, or Brixton Deverill, which is an ascertained spot, Alfred marches to Ecglea, of Asser—Iglea of the Saxon chronicle. We find it in Cley Hill ; though some have thought Westbury Leigh, on the high road from Westbury to Edington, was the place of his first halt. I prefer Cley Hill ; first, because Westbury would be in too dangerous proximity to the Danish Camp, perhaps within sight of Bratton Castle ; and secondly, because the name retains the last half of the word almost intact, the *c* and the *Lea*. Geoffrey Gaimar, a poet of the twelfth century, reads it *Aclee*. Thirdly, because it realises the meaning of the name itself. The *Ig-Lea*, island-mead or pasture. It rises like an island hill in the midst of a wooded plain ; and lastly, it is at a most convenient distance for the march and attack on the Danish Camp.

Alfred wished to surprise the Danes, and also to collect round him as formidable a force as he could to throw upon their position. For this object he does not move very far the first day in order to give every opportunity to stragglers to come up ; and he keeps within the forest as long as he can, till he gets nearly opposite to the Danish Camp. He fortifies himself ; and there are marks of such fortifications at Cley Hill, supposed to have been of very great antiquity—all the better for Alfred.

In the early dawn of the following day, “ mane illucescente,” he quits his camp and begins his march, and would easily come before the camp of the Danes by nine o'clock, as Geoffrey Gaimar says, the distance being eight miles. By this time his enemy would, of course, be awake and drawn up for action, but as they were

encumbered with horses, cattle and spoil, and not expecting an attack from an army of disciplined soldiers, the dense phalanx, "*densa testudo*," with which Alfred charged them, notwithstanding the most obstinate resistance, ere long broke their array, and a terrible slaughter followed. Those, who were able, retired to the fortified camp on the Down. Alfred boldly entrenches himself around the fortress and blockades it. Why did not the Danes burst forth? They had done so under similar circumstances before; but Alfred had cowed them by his desperate assault, and they were outnumbered. Every day the English host was being reinforced, while the Danes were suffering from want of provisions, and possibly also of water. The end was an unconditional surrender, signalised by the wise clemency and generosity of Alfred, who thus turned Guthrum from an enemy into a friend and ally.

Now all this can be shown to be consistent with Edington as the scene of the battle; but how about the other sites that have been mentioned? Heddington, in Berkshire, the conjecture of Lysons, is out of the question altogether, being 60 miles away! And Heddington, near Calne, also appears too much out of the way strategically for the purpose of watching Alfred or protecting Chippenham; and Alfred would have had to cross a considerable open plain to attack the Danes, and it has no tradition attached to it, the White Horse there being of certainly modern origin. The most plausible conjecture is that which links the spot to Yatton, near Chippenham. But, notwithstanding the able arguments which have been adduced in its favour, it does not seem to me to be consistent with all we know of the history. First, on account of the name, which sounds like the original name—Yatton is Gate-ton, or the residence near some passage or gateway, or road through a forest. It may have been the gate of Melksham forest; and there is no down near it now, nor any rising ground of sufficient importance to compare with that of Edington. Moreover, to understand the battle to have

taken place there, you must suppose Alfred to have made a long march of eighteen miles the first day to Highley Common—the “Iglea” of Whitaker and Dr. Thurnam—which place is simply a swamp nearly surrounded by water, and on the very road of the Danish communications with the south, so that they would be sure to have heard of his movements. Then Yatton is to the rear and west of Chippenham, and Old Bury Camp, to which the Danes have to retire over the ford of Slaughterford, is some distance to the west. So that Alfred would have placed himself between two fires and got into a very difficult country, attacking under every disadvantage; and when successful he would be in the enemy’s country, and he could not, perhaps, have maintained the blockade; whereas at Bratton he could completely isolate the Danish army and would be himself in too strong a position to be assailed from Chippenham, should any troops march to the relief of Guthrum. And after all Whitaker does not believe the battle was at Yatton, but at *Slaughterford*. This name is certainly referable to some bloody action in the neighbourhood. But may not the first attack of the Danes on Chippenham have been attended with slaughter of the Saxons? And this is, I think, confirmed by a name occurring a little to the north of Slaughterford, “Woeful Danes Bottom;” besides which it is known that there was a great fight at Sherston, not far off.

Again, if we refer to the Saxon chronicle, in the very beginning of the year 878—“The Danish host *bestole* (*i.e.* came suddenly) upon Chippenham, then *they rode through* the West Saxons’ land and *there sat down*, and mickle of the folk over sea they drove, and of the other the most deal they rode over, all but the King Alfred, he with a little band hardly fared after ye woods, and on the new fastnesses.” How came the victorious Danish army to be crouching behind the fortifications to the rear of Chippenham?

On the whole then, I think that the balance of probabilities is decidedly in favour of Ethandun being Edington. The name is almost identical, and tradition finding its expression in, or deriving

its strength from the White Horse, is deserving of grave consideration. The most learned archæologists all concur in supporting this theory. Contemporary historians fully confirm it; and the strategic and topographical reasons are, to my mind, most natural and conclusive. It will not therefore I trust be presumptuous in me, in opposition to the learned researches of most modern writers, to assert confidently my belief in the old established tradition of this being the scene of Alfred's crowning victory.*

The Chairman's Address on Topography. By Dr. HUNTER.

(Read 12th November, 1873.)

The following Address to the Club was not offered as a Communication of original matter, but rather as a useful address with which to commence the Winter Session. Its length has been reduced by the omission of some superfluous illustrations. To those who would pursue the subject the writer recommends examination of the publications of the Record Commission and the Master of the Rolls, and a perusal of the prefaces to the topographical volumes in the Bath Institution Library.

Again the season for the fields has closed to field clubs, and

* There is also a living witness to the original name that can I think be called, the furze bushes that crown the steep. It has been suggested that the root of the word Ethandun may be the British word *Aeth*, *Eth*, *Furze* or *Gorse*, and the origin of "Heath." The names of hills are more frequently found to be given them by the early inhabitants, and this dun may in old times have been known as the *Aeth-dun*, or *Furze Hill*. If we derive it from a Saxon root it may be traced to *Eth-a wave*; and this would well express the character of the hill, as it is very like a wave about to topple over into the plain below.

again cities and the hum of men are restored to our favour. In the good days past

" Health wandered on the breezy down
And Science on the silent plain ;"

but now the gaslit room must for a few months be the scene of our most useful operations.

Whether in the long days now gone by any of us has discovered aught, has made an original observation, has conducted a laborious investigation, or has created an hypothesis which may string together and explain the observations of others—all these questions will be solved as the winter passes and our transactions develop themselves. Few men are discoverers or can ever be so, and still fewer can hope to find acceptance as theorists. All are not investigators or observers, nor can men take up in middle life habits of accurate observation which were not encouraged in youth. Nevertheless "They also serve who only stand and wait," and it is with sincere welcome that I again greet ladies and gentlemen; whose presence here may show no more than an earnestness for knowledge of God's creatures and the works of man, or who are brought here simply by the praiseworthy desire to raise the tone of Bath society, and to support those associations which aim to leaven the mass of it with a taste for sciences and literature. A short Augustan age has illuminated in succession several English cities. Warrington, Lichfield, Exeter, Norwich and two or three more still look westward to catch a little gilding from a set sun. Who can doubt that Bath shall have her day, or that this is the spot where we must watch for the dawn ?

The Bath Natural History and Antiquarian Field Club is professedly a mixed body, one made by the mutual agreement of members who cultivate the knowledge of the local peculiarities which natural objects present, and who have attained to some general knowledge of natural history in order accurately to observe Nature in the pleasant aspect which she here presents ; together with other members who give attention to the minuter

details of past events which hardly rise to the dignity of history, but which derive a special interest from our residence upon the scene, members whose observations upon our remains of bygone man are rendered useful and worthy of record in our Transactions through their previous preparatory studies in what are called Topography and Antiquities. To those who have not adopted this latter branch of our subject, and to those more newly joined members who wish to add something to our usefulness, I have, without pretending to teach those at whose feet I ought to sit as a learner, prepared to address some remarks on what the study of Topography is, and on what can be done in the subject by one who brings the requisite temper and industry.

Topography has in England acquired a definite intention, and a rank among men's studies to which the subject has not attained in foreign countries. Topography is descriptive of a portion of the globe as Geography is of the whole, but Topography stoops over the microscope while Geography extends her powers with the telescope. Topography, like History, tells also the order of events, but she differs from both these sister studies in her dealings being merely with baronies, parishes, lords of the manor, and rectors of the church, while she has nothing to say of continents, empires, kings or popes. Foreign accounts abound of great cities and dynastic genealogies ; all these belong rather to Geography or to History than to Topography, and as to the latter the experience of every tourist proves that, in place of sound topography, the minute information he may usually receive of a parish or village abroad proves to be nothing of more worth than a pack of so called legends, such as any hired driver could invent to amuse his fare. I confess I am utterly sick of Keltic demons and Teutonic robber knights. In England some of our ablest historians and naturalists have been true Topographers. The study which had its birth with Leland and Lambarde, and which claims Camden and Dugdale among its devotees may hold up its head

in the same rank with studies usually considered more severe. I claim no more for Topography than it deserves if I say that the taste for minute local inquiries has affected the whole tone of the modern English historians. Such homely touches as are obtained from Topography give the charm to Macaulay, and perhaps in a less degree, to Froude. It is the acknowledged fault of many lofty historians and accurate chroniclers that they tell the history of kings, courts and armies, and leave the mass of the nation, the national life as it really was, to oblivion or imagination. The body of our country, through its insular form has been for many centuries homogeneous or nearly so as regards its laws of succession to property and presentation to the church, and consequently if we examine the descent of one sample manor we shall obtain a history which is, in its outline, the history of almost every manor in the land, and we shall thus gain a truer view of England in the past than if we fix our eyes with undue singleness of attention on the court at Windsor, the army on the frontier or the dungeon in the Tower. I am not forgetting that we may put too high a power on our microscope; that there always were millions of a labouring population, for the most part small farmers, whose names are never to be recovered, whose lives were but those of satellites to their lord, and of whom probably little or nothing is worth recovery. It is well understood that the numerous villains of early times were slaves, saleable with, though not without, the land they lived on. No event in the history of a parish could claim to rival in importance the change which converted the ancient villain first into the small yeoman in whom England used to glory, and since into the modern farmer and his servants. You can, however, rarely name a century even in which the emancipation was made. It was gradual in its method and in its localities. The King often wished to play off the workman against the baronage, and he occasionally succeeded. Thus, from the twelfth to the seventeenth or nineteenth centuries, the rural workmen were continually gaining rights here and there, few of

which they have ever lost. I have elsewhere ventured the opinion that the reign of George II. was the golden age of the rural population, but this was on the ground of the general plenty which turnip husbandry had brought us ; as to the law, it has been reserved to our own days to see a complete freedom of labour from *parish* settlement, which term in its fact meant *estate* settlement. You have little chance of fixing a year and a certain lord for any great step in the process of liberation, except in a corporate or quasi-corporate town, where an early charter has been granted to or purchased by the inhabitants, and my present idea in addressing a Field Club is the Topography of a village or country district.

Between these extremes, the king on his throne and the serf in the fields ; in the families of the lords large and small, and in the great adoptive families of a celibate clergy we find the domain of true Topography. To say nothing of Wales and Scotland, the most of which countries are as yet unreclaimed by the Topographer, the student has in England a vast field as yet imperfectly tilled by his predecessors. While I could count some English shires, such as Cheshire, Durham, Surrey and parts of Yorkshire, (not meaning, however, to exclude the works of Hasted, Blomefield, Hutchins, Nash and others,) to which noble monumental folios have been erected ; there are other counties such as Hampshire, Devonshire, Suffolk and Herefordshire, and perhaps nearer to home, where no worthy topographical effort has as yet been completed. Let the vast collections to be found in manuscript in the public libraries be evidences that the deficiencies of Topography are not altogether due to the apathy of her own disciples. These monumental folios require either a patron or a public, and it is not every county that can boast a Sir Richard Hoare, or can raise such repeated subscription lists as Dorsetshire.

The Topographer, who in the present day undertakes a district hitherto imperfectly described, has a great advantage over his predecessors, through the recent cataloguing and making public

of our vast national records—a collection quite without a rival in the world ; and it is upon the uses to which he may put such collections, whether those belonging to the nation or to be found in the great libraries, on the resources from which he may reasonably expect material, and on his best method of distributing the subject that I proposed to say a few words to suggest deeper inquiries than can be dwelt on in such an address as this.

The first necessities of the Topographer are a heart to love his district and an eye to see it ; he *should* be a resident, he *must* be a frequent and diligent visitor. Fortunately for him he may now reside in a remote part and yet be able to use the treasures of Oxford and London. Having acquired through travelling, reading and the use of maps a general knowledge of England, he must bring that knowledge to the valuation of whatever seems to him remarkable in his own district. He must have sufficient architectural knowledge to be able to verify history by his inspection of the details of the ancient buildings which adorn his district. He must have such philology as shall save him from the trippings of nomenclature. He must bring to the service a power of decyphering old deeds, coins and inscriptions, which may be best obtained at the great museums. He must possess himself for easy reference of such standard books as Camden, Dugdale or Collins, and the works of his own local predecessors, if he has any.

Unless the Topographer's country contains some great abbey of early foundation or some seat of royal power, he will have little to do with the speculative history of times before the eleventh century. It will be a mistake if he draws the scene of a battle of the Heptarchic crows and kites, or of the Danish invasion within his boundaries, only to swell his volume with the great deeds of a king. It is only when there are remains to be described that the events of national history may be introduced into Topography for their elucidation. Such events belong to the wider field, and a reference to them is sufficient. On the same principle the fact that a single parish or small manor belonged (perhaps with scores

of others) to some great Norman house, will not entitle the Topographer to introduce baronial biographies, and nothing beyond a mere skeleton pedigree of such a family as Lacy, Courtenay or Warren is ever admissible.

With a few remarkable exceptions of rare interest pure Topography must be content to make its beginning with the reign of the Confessor. Roads, barrows or fortresses of earlier date may exist, but of them we commonly know no *local* history. We either know nothing of them but what we see, or else what we know is national history. Interesting conjectures such as those which take the Clul in pilgrimage to Eddington, the probable site of Alfred's most critical victory ; to Dyrham, where, perhaps, the battle passed after which Bath lay in dust so many years ; to Camerton, where the late ingenious Mr. Skinner re-erected the towers of the Cunobelins ; or to Marshfield, one of the alleged scenes of the martyrdom of the holy Oswald ; such speculations may adorn your book as being professedly digressions, but between them and the recorded facts of Topography there is a chasm which is not bridged over in half a dozen places in England if we except a few of the royal castles and older abbeys. Has it not struck you how rarely the inscribed Roman stones have served any topographical purpose ? At Bath not a word is found about the hot waters ; at Colchester not a mention of Camulodunum ; on the Wall but little of the Wall ; at Highcross no monument of the Roman geographical centre of England ; and nowhere any record of Albanus, of Aaron, or of Julian. The inscribed lead is, perhaps, the best thing the Roman antiquaries have to show ; the coins illustrate Roman history, but rarely or never British topography. In a few rare instances the History of Bede, or Saxon Chronicle, names a village which has, perhaps, been recognised and identified, but is as probably erroneously so. For an instance, the Saxon Chronicle records an earthquake at "Wick." How glad would field club geologists be to know where Wick stood ! We are at liberty to hypothesise that the

place mentioned is our Wick-with-Abson, or any other Wick ; but then this entry in the Chronicle stands by itself, and bears no relation to any subsequent mention of Wick, there is no continuous history, and therefore Topography cannot here make her beginning even if she is persuaded of the identity of the site. We may guess that as a part of the lands of Glastonbury Wick is the more likely to gain notice in the Chronicle, but we do not *know* where stands this Wick of the Chronicle, we do not even *know* where Ethandune stands, disguised as it is to us in its early English spelling. It is not given to every hamlet to enjoy the lucky confirmation of its historical claims which the finding of King Alfred's jewel gave to Athelney farm, the cradle of that inspired system of law and language which now rules a fourth of the globe. The club topographer must exorcise such Wills o' the wisp, he must be content to begin with the Confessor, and consign to a foot note, or better to a waste basket, all such speculations, while as to the Wansdyke, Avebury or Stonehenge, topographical facts as they undoubtedly are, they have long been the subject almost of a separate science, and so he had best leave them.

As years pass on affairs in English Britain settle down, historians increase in number and perhaps in merit, charters to religious houses are made, and being preserved or quoted some true topographical information turns up early here and there. The parishes had grown up in number, nearly every hamlet had received a name, and the land seemed ready for the exact description or survey which was made in the eleventh century. This wonderful work, so well known as Domesday Book, is the very beginning of *existence* to nearly all the English manors and of *history* to the parishes. Here begins Topography, and from the account of the land given in Domesday is in most instances deducible a more or less complete local history to the present day. This noble record is now a common printed book. The five western counties have, in addition, the special advantage of the

"Inquisitio Gheldi," now in Exeter Cathedral, which is a sort of second edition of Domesday, and resembles it in arrangement, but contains many names not found elsewhere. It is probably known to you that Domesday schedules in each village the name of the owner and his tenure, his tenants and their class or description, his land, its extent and its nature of cultivation, and (where such things existed) the castle, the mill and other public buildings. The book is very difficult to read, and antiquaries are far from agreement upon its meaning. The spelling is so degraded that one fails to recognise many of the names of places, and some of the technical latin words remain unexplained. Still the book is the true fount of topographic knowledge; it is here that the Topographer must begin; and it is hence all his story must be traced. Domesday tells us who were the earliest Norman owners, and frequently also to what great English chiefs they succeeded. Thus it is that William is known to have deprived Aluric of Bathwick and to have granted it to Geoffrey, Bishop of Coutances. In many instances Domesday does more, for it records the fact that the king's immediate grantee had parted with his land in parcels almost as soon as he got it, and that as he had no power to sell, he had sublet, or as it is technically called subinfeuded. Two hundred years afterwards records of a similar kind were made; the intervening centuries are times of darkness and difficulty to the Topographer, who with the chain of evidences in his hand, has to take a sort of leap in the dark from off the rock of Domesday, hoping to alight in safety upon the Red and Black Books of the Exchequer. I will here quote from the preface to the "South Yorkshire," that it is too well known to all who have attended to inquiries such as these, that the reigns of the sons, grandson and great grandson of the Conqueror are ages of obscurity, and that it is not till the reign of Henry III. that we have much direct and regular information respecting the descent of properties however great. In the dark period before that reign we are obliged to collect our information

in the best manner we can from the records or the charters of the religious houses, most of which were founded during that period and had most of the lords of the subsidiary fees amongst their benefactors ; or from pleadings exhibited in later times, when it was necessary to set forth a title from an early period ; or from solitary and casual notices in record, chronicle or charter, under which head may be placed the occasional notices in the Pipe Rolls of the Exchequer.

Records from which the Topographer may hope to glean notices of the lords of his district now come in considerable numbers. I may mention the "Testa de Nevill," an inquisition of lands held of the crown by Knights' service, which was made by one of the judges itinerant of Henry III. ; "Kirkby's Inquest" of the fifth of Edward I. ; the "Nomina Villarum" of the ninth of Edward II. ; and the very valuable "Inquisitiones Post-mortem," which begin with Henry III. and are continued to the seventeenth century. These Inquisitions are best got at in a manuscript in the British Museum, called Cole's Escheats.

The grantees of the Conqueror often preferring a foreign residence, and sometimes holding lands in diverse counties at once, their subinfeudations became the foundation of the resident territorial ownership of England. A bonus was probably paid upon the grant from the King's immediate tenant, and afterwards feudal services or rents were yielded to him ; but as these became by degrees of less and less value relatively to the land, and as they lapsed out, the new families of sub-tenants have become the absolute owners of the fee, paying service to the crown only, and so they now remain, some old families being able to trace their estates to those subinfeudations, while rarely, if ever, has anyone of William's tenants-in-chief handed down his land to an heir now in possession. The intending Topographer must not, however, think that all is now plain sailing, for attainders, resumptions by the crown and alienations to the church await the manor in subsequent times ; but still as an experienced writer has observed,

"the fiefs themselves remained entire, capable of distinct consideration, so that this distribution made at the Conquest has been substantially maintained from that time to the present, and is in fact the origin of rights to land, rents and franchises as they exist at the present day."

Just as the great fees had passed away, the sub-fees, through division, were in many instances obscured and seemed to pass away also, until in succeeding generations we get down to what are now understood as manors, and sub-division has nominally gone no farther. It is, nevertheless, true that although these manors became independent units of lawyers and historians, although the great lord who had been known as the owner of a certain great fee, came to regard himself as the owner of a bundle of contiguous manors, it has never been forgotten by antiquaries that these manors still compose the great fee, and that the change is one of name more than of fact. There doubtless was utility in the change of form, and manors have sometimes been severed from their brethren in the great fee ; still the manors themselves have not been subject to sub-division, and our modern freeholders, free as they are, must be constitutionally regarded as holding of the manor.

Having written the history of the great fee, or ascertained that it has been written by Dugdale or other of his classics, the topographer must now commence to write a history of each manor from its first development from out of the fee down to the present time. The manor is still one and indivisible, its owner wears the crown in the little succession, and although politician after politician, enthusiast after enthusiast, "sad lozel" after "sad lozel" forfeited or sold the fields until the manor is but a skeleton yielding no juicy income to its lord, the lord, known or unknown, remains, perhaps, a journeyman or perhaps a gold-digger, but as true a sovereign within his limited right, and by the same law, as any of the large family who may now dine together at the ordinary at Venice. It was this little prince,

whether of wide fee or small manor, who built the church, the mill, the bridge ; his sign manual still authorises the village fair ; he imposed the rents ; he liberated from feudal service ; he raised his tenants for the Red or White Rose, and it was he who brought the jealous neighbour or offended King down in vengeance upon his faithful followers. There he lies on an altar tomb, his wife by his side and his dog at his feet.

If the topographer is fortunate he will find some small charitable endowment, a hospital for lepers or a scholarship at the University in the village of our idea. This may be the work of the lord, but it is not less frequently the work of one of humble birth, citizen, goldsmith and Lord Mayor, or perhaps Chaplain, Bishop and Lord Chancellor who has remembered the remote village which gave him birth ; and I know not how an old man can more wisely lay down "the staff of age which youth doth travail for." I recollect two or three instances in which bishops have built sumptuous tombs to their obscure but honoured parents. The topographer will, however, be usually disappointed of such pleasant discoveries, and will hear no more of the state of the peasantry than may be afforded by an old book of local husbandry. Such, then, is the civil history of rural England until the Puritans swept away the feudal idea with fire and sword. The restoration of the King restored much, but not the manorial tenures in their singular character, and the statute of Charles II. commuted nearly all feudal services into a money payment. From that time the freeholder (as we call him) and even the copyholder rose into practical independence of the manorial lord.

From what I have said it will be inferred that in proposing a topographical work it will be best to choose the area of one of these great secondary fees. The tenancies in chief rarely lie compacted together, the subinfeudations more usually do, and in tracing the history of such a tract of land, say a twentieth part of a county, we have a chain of events and we have within the boundary a development of life quite independent of our neigh-

hours. Such a topography is as the history of an island, and the advantage of this mode of treatment is so obvious that you may be surprised to hear that any other should be in use.

Yet so it is: Rudders' edition of Atkyns's Gloucestershire, for instance, is an alphabetical list of parishes. Under this system it is difficult and always unsatisfying to deal with lordships which embrace several parishes. There must be either perpetual references or repetitions. I feel, in examining such a book, as one of your naturalists might feel with regard to an alphabetical account of plants and animals compiled quite irrespectively of genera and species. Other topographers have attempted a political subdivision into Hundreds and Townships, and this is the plan adapted by Hoare, Blomefield, Hutchins, Collinson and Phelps. These divisions are of very early date, but they bear, as I believe, no relation to the history of a place or the succession of lords. A Hundred has been for centuries a mere geographical expression, except in matters connected with the constabulary and the militia; some of the Hundreds are lost and the boundaries of many are changed, and above all is the objection that the Township is no development from out of the Hundred but the Hundred rather a subsequent compound of Townships. Again a large proportion of our topographers have been from among the resident clergy, and they have naturally sometimes attempted an ecclesiastical subdivision into Rural Deaneries, Parishes and Chapelries, and to this there is less objection, as a certain expansion from the great mother churches can sometimes, though rarely, be traced. Still, the history of the local development of the church is not the history of the country; the remarkable actions were those not of the curate but of the lord, and the ecclesiastical history of the village, beyond a mere list of incumbents and patrons, has (except, perhaps, the first alienation of the tithe) no salient events and is best related as part of the history of the diocese or great abbey to which the church belonged. In nine cases out of ten where there was a lay patron he was also the lord, and when in

later times lay rectors became common they had usually the right to nominate the vicar.

By a feudal distribution of your subject you are enabled to open your volume with an account of the King's tenant, his descendants and his *caput baroniae*. This once done, repetitions are rendered needless. You proceed with the first great fees, the genera, and you go on with the atomic manor, or the species. Except in a few striking instances, such as the Castle at Rochester, the primary tenants of the King have left few or no traces of their life here: it is the great subinfeudated tenant or mesne lord who built the castles or religious houses of which you represent the ruins, and it is the smaller manorial lord who has built the Tudor hall of which you are so justly proud. Probably the mesne lord's family has passed away, or possibly a cadet branch may remain seated upon one of its ancestors' many manors, and genealogical investigation will be among your most laborious services.

It has been justly remarked that though the deduction of families necessarily forms a part of topographical books, pedigrees should only find a place there as they serve to exhibit the descent of properties. The history of a family is only subsidiary to the history of the manor. The early history of a family is not to be drawn in because in later times it acquired a manor in your district, unless you have something original to tell which may be told without a washy dilution from printed matter; nor need you attempt to trace the heir after you have seen the family safely off the premises. Such pedigrees as are necessary should by all means be put in a tabular form; these diagrams catch the eye and are apprehended at a glance.

There are counties of more early civilisation than others: in these the fees are comminuted to such an extent that one small parish is sometimes found to be in two manorial holdings. The general rule of later times is, however, one parish, one manor, one unit; and this, the reason for which is the assignment of a certain *sithe*, is a great additional convenience to the topographer.

I have told you that the Topographer's worst troubles begin when he first cuts loose from Domesday ; then is the time to try his mettle, and labour he must if he will show for the first time the line of lords of the twelfth and thirteenth centuries. Charters, records and grants must be searched everywhere and always, and the Fates' rewards will come quite capriciously and irrespectively of the labour bestowed in the search. What the Topographer's resources are I may now shortly detail from a communication on the subject by a well-known antiquary which was read to the members assembled in this Institution well nigh fifty years ago.

"If there is something which cannot be known, there is very much also that is open to everyone in the written records of the past, and very much also that is open to him in an easier manner, the original records having been scrutinized by the laborious antiquaries of the sixteenth and seventeenth centuries, and made to yield what they contain concerning the more eminent persons of our nation, all of whom stood in the relation of lord to one or more of these feudal supremacies. In fact the lines of those who were tenants *in capite*, those who held the great feudalities immediately of the crown, as hereditary dignities usually inhered in them, have been the subject of research by those who have written on the descent of the hereditary dignities of the realm, and in the main the results have been so complete and successful that little remains for the Topographer but to adopt what has been prepared for him, and happy is he if he can sometimes correct a date or supply a new name. Thus much with respect to the higher order of feudal lords ; and what is said of the sources of information respecting them, may, in a qualified manner be said of those who held of them large tracts and divers vills in the position of mesne lords ; for these, the men of the second layer of the population of England, often became the possessors of hereditary dignities, and, like the chief lords, the subjects of research to the writers whose subject was professedly genealogical. But the case is different when we descend to the owners of single

manors, or to families among different branches of whom a single manor was divided. We have then a class of persons who may or may not have been the subject of enquiry to anyone before us, and of whom the Topographer is perhaps the first to bring their names from out of the obscurity which rests upon them. In these cases he must apply himself resolutely to his work. If he has collections for his county made by some former collector, and preserved in manuscript, he is fortunate, for they will serve at least as guides to his authorities, and sometimes may be allowed to supply the place of his own research. If the heralds have preceded him, he may find the sequences of the lords as they have recorded them; but in respect of races of whom no authentic account has previously been given, it is his duty to search for himself, and to gather for himself from the remains of past ages who they were, how they followed each other, and what was done by each. And for this purpose he has first the great Norman Survey, in which the name of the founder of these smaller feuds is sometimes to be read. He has his chance of meeting with him again in the Chartularies which contain the deeds of the eleventh, twelfth, and thirteenth centuries, either his own, or of persons who claim him as their ancestor. He may even be so fortunate as to find deeds themselves. He may search the early proceedings in the courts of justice, where we have sometimes titles traced to the conquest. He may find a transaction or two in one of the earlier of the Pipe Rolls. When we approach the time when what the law calls 'the memory of man' begins, he may, and probably would find transactions in the Fines which would show who in those early times had stepped into the place of the original mesne lord, how the tenancy had become divided, and possibly even the record of a transfer from one family to another. He has also the Red Book and the Black Book of the Exchequer, rich in matter of the greatest importance to him, as showing in whom the fees were vested at particular periods; and in the Testa de Nevil he may be so fortunate as to meet with notices

which carry him far back into the dark periods before the date of that mysterious compilation. We have then the results of the enquiries which were made concerning feudal rights, and, I may add, feudal usurpations, in the reigns of Henry III., Edward I., and less remarkably, Edward II., contained in the Hundred Rolls, the Quo Warranto Rolls, Kirkby's Inquest for the counties for which it exists, and the Nomina Villarum. Much matter also remains of record not incorporated in any of these, the grander records of the realm, in the accounts of the collections of feudal aids. But when we reach the reign of Henry III. we are within scope of a class of record evidence which is of all the most important for the particular purpose now under consideration. I mean the inquisition taken before the escheators on the deaths of persons all or most of whom were of the class of persons we are speaking of, either tenants in chief of the crown, or tenants of those who held of the crown, or tenants again of those tenants. The inquisitions show us distinctly who at a particular time held a particular property, with some circumstances of that property. But they show more, they show when an actual possessor died, who succeeded him, and of what age the successors were, and often transactions respecting the property. But they bear for the purposes of Topography information scarcely less important than this. They show the tenures; that is, the person dying held such a manor of such a person, thus giving us not the mesne lord only, but the chief lord also, and presenting us evidence of subinfeudations of which no contemporary record exists, and possibly where no written evidence was ever prepared. Those inquisitions are of unspeakable importance. Where the series is entire they present an authentic contemporary account of the transmission of feudal rights from the reign of Henry III. to that of Charles I., a noble stream of evidence, which it is to be lamented was ever allowed to be dammed up. Accompanying these are many other series of national records which might be consulted for the chances of what might be found in them were not the

task too great to be undertaken by any person, however resolute, with the purpose of going through with it ; and beside these there has been a constant accumulation of private deeds, in which transactions between private parties have been recorded, either still in the hands of possessors of the manor, or dispersed among the collectors of curiosities such as these. Many also which have found their way into the Record Offices, or such places of deposit as the British Museum.

For later times, when the Topographer loses the benefit of the inquisitions, his best resource for establishing the series of feudal chiefs is, undoubtedly the records of the College of Arms. It is to be regretted that the visitations ceased soon after the inquisitions ceased, because in them there was something approaching to a systematic attempt to keep a registry of the families in whom was vested the chief property of the country. When the visitations ceased the information placed on record in the heralds' books has been but anecdotal, with the exception of that which respects the transmission of dignities. But it is copious, valuable, and (such is the care taken) most authentic. Where these fail him the topographer must spell his way for the last two centuries as well as he can by the aid of wills, parish registers, private information of persons cognizant of the facts, monumental inscriptions, the printed obituaries, the London gazettes, together with such information as is allowed to escape from family archives."

Wills have been used to be kept in the muniment rooms of a large number of ecclesiastical courts throughout the country. Extracts from wills as well as records of sales may sometimes be found among the records of manor courts. Both are of great value to the Topographer, who must usually however hunt till he finds them. The wills in the greatest receptacle, the Prerogative Court, London, extend over nearly five centuries and are catalogued.

The records of the Church are of course a great power in topography, and the bishops' lists of presentations will sometimes,

when more exact information fails, tell us the succession of lords, for the patronage was most usually united to the lordship. From the knowledge of the early patrons moreover we are guided to a reasonable conjecture as to the founder, for the right of presentation followed the founding, the bishop consenting to the good old rule that when a lord built a sufficient church, the tithe of his manor should be devoted to its support. In a great deal too many of the parishes of England (fully one-half) the tithe of the rector was diverted to a monastery, often distant and sometimes foreign. The rectorial office disappeared and a priest was supplied by the monastery, and was called a vicar, who was to serve the church and subsist on a stipend aided by tithes on small produce. For a record of this transaction, certainly one of the greatest events in the history of a parish, diocesan registers must be searched. The consent of the bishop was necessary and the conditions are usually recorded. Besides these diocesan records references to MSS. authorities on this part of topography are to be found in the great *Monasticon* and other similar works. Another great event in the church history of a parish was the foundation of a chantry, an act of zeal sometimes intended as monumental of a person or event, and sometimes as a means of edification by preaching or the exhibition of pictures. Chantries were often the work of clubs or guilds whose existence is a curious phenomenon by no means to be neglected in a good local history. The practice of assigning the tithe of a manor to a new church, or in other words the creation of new parishes ceased about the reign of Henry I.; subsequent buildings were called chapels; and although districts called chapelrics were assigned to them they had no tithe. Of these the bishops' records give but a scanty account.

Beside the records of the dioceses and charters of the abbeys we possess a few lists or returns, as we should now say, of the value of livings, of which Pope Nicholas' Taxation of 1291 and King Henry's Valor of 1535 are the most important, and being printed are easy of access.

In addressing the Topographers of a Field Club one has not in contemplation the writing the history of a monastic institution, this is not a matter of common Topography, and if you are so fortunate as to have such a foundation in the district you deem to be put in your charge you will find the work almost done for you. The annals and the catalogues of charters which were made by the religious afforded to the compilers of the large works on English Ecclesiastical History copious information of these places. Of their end and the immediate succession to their property the public accounts are fortunately abundant.

There is more still to do to conclude our proposals for a Topography of a group of villages: the few post-reformation foundations, the grammar schools, almshouses, colleges, must all be examined and historically described. Lives of interesting persons hitherto unknown in print, records of visitations of the plague, the puritan conventicle, the rise and fall of manufactures, the drainage of great marshes, the mines, the changes of the means of intercommunication, the building of the church and manor house, the trees, woods and wells of ascertained date, the bells, the parish registers and churchwardens' accounts, all these are usually matters which well bear comment. In all, printed matter, unless very rare, should be referred to and not reprinted, and let the difficulty which even the most experienced feel in ascertaining whether an event is of interest, ephemeral or permanent, warn the tyro against attempts to "bring down," as it is called, "the history to the latest dates." And lastly I wish to say that the creation of a great Topographical volume must be the work of one mind, in which the natural propensity or taste is strongly developed. The work of our Field Club, as a club, is to collect, collect, collect, and when the due season brings to our noble county a worthy Topographer, he will bless and commemorate us. If slow collection seems a humble task, hasty generalisation is truly a vain one; for appreciation the topographical collector must wait, in time he will get it.

On some of the Fungi found in the Bath District. By C. E. BROOME.

(Read February 11th, 1874.)

ORDER 10. MYXOGASTERS.*

Myxogasters derive their name from their early condition, in which they resemble a creamy mass spreading over rotten wood, dead leaves, &c. Following the arrangement adopted by Mr. Berkeley in "The Outlines of British Fungology," they constitute the 10th Order of Fungi, it is chiefly in their early, or creamy state that they differ from other members of the family, and it is only when mature that they resemble their nearest allies the Trichogasters. When mature they consist of variously shaped, stipitate, or sessile peridia of a horny or membranous substance, containing generally a mass of threads called a capillitium, mixed with a quantity of dusty spores; on the peridia breaking up the spores are dispersed. De Bary, Professor of Botany at Freiburg, observed that when the spores were sown on damp, rotten wood, or in a drop of water on a slip of glass, they did not produce threads like other Fungi, but gave origin to minute, gelatinous bodies endowed with a movement similar to that of certain animals of a low type, viz., Rhizopods, that they produced cilia, and moving about the surface of the glass by their aid, at length became stationary, that they then lost their cilia, and after a considerable increase in bulk or prolongation into branched or reticulate masses, they produced clusters of the peridia at the expence of their mucous contents; the peridia gradually became invested with a distinct membrane from which processes of a horny or filamentous character arose, filling up more or less the interior, the interspaces being filled with dusty spores. From the similarity of this mode of development to that of some of the lower animals, De Bary concluded that the Myxogasters belonged properly to the animal and not to the vegetable kingdom, and he

* Myxogasters from the Greek *muxa* a mucus, and *gaster* a stomach.

wished to give them the name of Mycetozoa, as combining the characters of animals and Fungi. Other botanists have not been convinced by his arguments, relying more on the general accordance of the bodies we are discussing when mature, than on their early state. Several facts seem to corroborate the more general opinion ; for instance, De Bary has himself published observations on some undoubted Fungi whose spores germinate by means of zoospores, such as *Cystopus* and *Peronospora*.* and not by threads. Again, the taking in and assimilating solid food is generally regarded as a proof of an animal nature ; this fact may be easily seen in many of the lower animals, but it has never been distinctly seen in the motive bodies of *Myxogasters*. Although the spores of the latter sometimes germinate by means of zoospores, yet such is not always the case ; Mr. Currey has seen the spores of *Cribraria* germinating by threads. We may, therefore, safely follow the more general notion, and include *Myxogasters* amongst true Fungi. The Genera in this Order are founded on the nature of the peridia and the contained threads which mostly resemble those of the *Trichogasters*, the spores are very similar throughout the Order. The spores are globose measuring from the 3-1,000 to the 3-500 of an inch in diameter, composed of a simple membrane, smooth or slightly rough or warty, they have a thin spot on one side where the zoospore makes its exit, they contain a mass of protoplasm with one or two nuclei sometimes mixed with oil-globules.

GENUS 75. *LYCOGALA*.† MICH.

Peridium double, papyraceous, externally warty or chaffy, bursting at the apex. Flocci delicate, rough at the margin, flattish.

- 1.—*Lycogala epidendrum* Fr. Sow. t 52. Grow. t 38. Common on rotten wood. This plant is of a fine red colour in its

* *Annales des Sciences Naturelles*. Ser. iv., vol. x. p. 236.

† *Lycogala* from lukos a wolf, and gala milk.

early stage, the contents of the peridia often oozing out like drops of blood. A small, flat variety occurs on rotten sticks of *Rubus fruticosus* at Batheaston, but it seems identical in structure. *L. parietinum* Fr. grows on damp paper, &c., but it has not occurred in our district.

GENUS 76. RETICULARIA.* BULL.

Peridium indeterminate, simple, thin, bursting irregularly, fugitive. Flocci attached to the peridium, flat, branched or somewhat reticulate.

- 1.—*Reticularia umbrina* Fr. Sow. t 272. B t 8. Leigh Woods, Bristol, on stumps. The three other species recorded as British have not occurred in our locality.

GENUS 77. ÆTHALIUM. † LK.

Peridium indeterminate, covered with a floccose evanescent bark, cellular within from the interwoven flocci.

- 1.—*Æthaliium septicum* Fr. on rotten wood at Freshford, this species is common in most localities but has not been much observed here. *Æthaliium vaporarium* Fr. grows on tan in stoves but has not occurred to me in our district.

GENUS 78. SPUMARIA. ‡ FR.

Peridium indeterminate, simple, crustaceous, cellular, spores surrounded by membranaceous, sinuous folds.

- 1.—*Spumaria alba* Dc. common on living grass. The only species.

GENUS 79. PTYCHOGASTER.§ CORDA.

Peridium thick, fleshy, slightly stalked or sessile, cellular within, the strata of cells irregular, fertile and sterile mixed; spores

* *Reticularia* from reticulum a little net.

† *Æthaliium* from aithale soot, owing to the black mass of spores covering surrounding bodies.

‡ *Spumaria* from spuma foam, it resembles froth in its early stage.

§ *Ptychogaster* from ptuchos a fold, and gaster a stomach.

simple, growing on the threads. The only species *P. albus*, has not occurred here, it is found on stumps of fir trees. The affinities of the Genus are very doubtful. I have followed Mr. Cooke in his Handbook in placing it here. It is not creamy in its early stage and thus does not answer to the character of the Order. Corda Icones ii. f. 90.

GENUS 80. DIDERMA.* P.

Peridium double, the outer one distinct, crustaceous, smooth; the inner one delicate, evanescent, attached to the flocci, with or without a columella.

- 1.—*Diderma vernicosum* P. Sow. t 136. Grev. t 111, the only species that has occurred within our district out of 13 British is very common on dead twigs, &c., in the woods.

GENUS 81. DIDYMIUM.†

Peridium double, the outer one breaking up into little scales, the inner membranaceous, delicate.

- 1.—*Didymium melanopus* Fr Bischoff t 3669. On rotten wood, Langridge.
- 2.—*Didymium hemisphaericum* Fr. Sow. t 12, not uncommon on dead leaves, &c.
- 3.—*Didymium squamulosum* A & S t 4 f. 5. On dead leaves common.
- 4.—*Didymium leucopus* Fr. On dead wood, &c., Batheaston.
- 5.—*Didymium lobatum* Nees f. 104 on moss, &c., Rudlow.
- 6.—*Didymium Cinereum* Fr. Batsch f 169 on decaying stems,
- 7.—*Didymium serpula* Fr. Batheaston on rotting plane leaves.

This species seems rare, as it has occurred here only once, and was then new to Britain, it occurred in Scotland the same year.

We can only claim 7 out of 17 species recorded as British, it

* *Diderma* from *dis* double, and *derma* the skin.

† *Didymium* from *didumos* double.

is probable that several other species exist in our district but from want of good figures and authentic specimens there is considerable difficulty in determining them.

GENUS 82. *PHYSARUM*.* P.

Peridium simple, membranaceous, naked, smooth, bursting irregularly, columella none.

- 1.—*Physarum nutans v aureum*. P. Grev. t 124. On rotten sticks of *Rubus fruticosus*, Batheaston.
- 2.—*Physarum metallicum*. B. Mag. of Zooly. and Boty., No. 29. t. 3, f 8. In the same localities as the last. This species is iridescent and resembles *Lycogala* in the pink colour of its spores.
- 3.—*Physarum album* Fr. Grev. t 40. on decaying herbaceous stems, Batheaston.

Out of 7 British species we can only claim 3 as yet, probably from want of more accurate figures.

GENUS 83. *ANGIORIDIUM*.† GREV.

Peridium Membranaceous, opening by a longitudinal fissure; flocci adherent to the peridium on all sides, reticulate, flat, ending above in an inner peridium.

- 1.—*Angioridium sinuosum*. Grev. t 310. Sow. t 6, near Bristol, on *Pteris asquilina*. The only species. Fries combines it with *Physarum* in his *Systema*.

GENUS 84. *BADHAMIA*.‡ B.

Peridium naked or furfuraceous, spores in groups enclosed at first in hyaline sacs. Berk. Linn Trans. XXI. 153.

- 1.—*Badhamia hyalina*. B. Linn. Trans. XXI. t 19. f 3. the only

* *Physarum* from phusa a bladder.

† *Angioridium* from aggeion a vessel.

‡ *Badhamia* named after Dr. Badham, the author of *Esculent Fungusses of England*.

species occurring here out of six described in the Linnæan Transactions. Batheaston on rotting stumps. The very delicate sacs which enclose the spores at first soon collapse and disappear, the spores are often rough on one (the outer) side of each when they are grouped together.

GENUS 85. CRATERIUM. *

Peridium simple, papyraceous, rigid, persistent, closed at first by an operculum. Flocci congested, erect.

- 1.—*Craterium pedunculatum* *Trent.* Nees fig 120, on small sticks, dead leaves, &c., Batheaston.
- 2.—*Craterium lencocephalum* *Ditmar* in similar situations, out of 5 recorded as British we can only claim two.

GENUS 86. DIACHEA. † *Fr.*

Peridium very delicate, simple, falling off in fragments. Capillitium subreticulate, springing from a grumous, pallid columella.

- 1.—*Diachea elegans* *Fr.* Bull t 502 f 2. Corda, Icones V. f 38.
The only species, a specimen was sent me by Mr. Stephens from the neighbourhood of Bristol some years ago.

GENUS 87. STEMONITIS. ‡ *Gled.*

Peridium very delicate, simple, evanescent. Capillitium reticulate, springing from the dark, penetrating stem.

- 1.—*Stemonitis fusca* *Roth.* Grev. t 170. Leigh Woods, Bristol
- 2.—*Stemonitis obtusata* *Fr.* common on dead wood.
- 3.—*Stemonitis violacea* *Fr.* on moss, Rudlow.
- 4.—*Stemonitis arcyrioides* *Somm.* Batheaston. This plant is very beautiful, it is iridescent and resembles little gems upon

* *Craterium* from crater a goblet.

† *Diachea* from the Greek *diacheo*, I diffuse, or pour out, from the rapid way in which the plant spreads in its creamy state.

‡ *Stemonitis* from *Stemon* a stamen.

the dead leaves, &c. We only have 4 out of 9 British recorded in our district.

GENUS 88. ENERTHENEMA.* BOWM. LINN. TRANS.

Peridium very delicate, simple, evanescent, except at the apex where it is adnate with the dilated top of the penetrating, dark stem. Capillitium dependent, attached to the dilated disk. Spores surrounded by a cyst.

- 1.—*Enerthenema elegans*, *Bowm.* Linn. Trans. XVI. t 16 (*plate* 1, *fig* 6c), on rotting boards. Batheaston. The only species.

GENUS 89. DICTYDIUM.† SCHRAD.

Peridium simple, very delicate, reticulated or veined from the innate capillitium.

- 1.—*Dictydium umbilicatum* *Schrad.* Grev. t 153. Rudlow. The only British species.

GENUS 90. CRIBRARIA.‡ SCHRAD.

Peridium simple, persistent below, vanishing above. Flocci innate, forming a free network in the upper half of the peridium. Out of 4 species recorded as British in Cooke's handbook none has occurred here, they grow chiefly on fir stumps which do not abound here.

GENUS 91. ARCYRIA.§ HILL.

Peridium simple, upper part very fugacious. Capillitium elastic. Flocci, not spiral.

- 1.—*Arcyria punicea*. *P. Sow.* t 49. *Grey.* t 130. Very common on rotten wood.
- 2A.—*Arcyria incarnata* *P. Observ.* I. t 5, fig. 4, 5. Common.
- 3A.—*Arcyria cinerea* *Schum.* *Burl* t 477, f. 3. Common.

* *Enerthenema* from *enerthe* below, and *nema* a thread.

† *Dictydium* from *dictyon* a net, and *eidos* a resemblance.

‡ *Cribraria* from *cribrum* a sieve.

§ *Arcyria*, from *Arcus*, a net,

- 4A.—*Arcyria nutans* Fr. *A. flava* Grev. t 309. Sow t 260.
Batheaston, on rotten wood. Out of 6 British, we have 4 species.

GENUS 92. OPHIOTHECA.* CURREY.

Peridium simple, bursting longitudinally. Capillitium two-fold, one consisting of delicate, hyaline threads, to which the spores are attached; the other of echinulate, thicker, branched filaments.

- 1.—*Ophiotheca chrysosperma* Currey. Mic. Journ. II., p. 240, t 9, Cooke, Handbook, p. 402, fig. 91. Batheaston, on rotten cabbage stalks. The only species.

GENUS 93. TRICHIA.† HALL.

Peridium simple, persistent, membranaceous, bursting irregularly above. Threads spiral.

- 1.—*Trichia rubiformis* P. Bull, t 502, f. 1. Cord. Icones, f. 288. Batheaston, on rotten wood.
- 2.—*Trichia pyriformis* Hoffm. Sow t 279, Hoffm Crypt t 1, f. 1. Langridge.
- 3.—*Trichia clavata* P. Sow t 400, f. 6. Common on rotten wood.
- 4.—*Trichia fallax* P. Bull t 417, f. 2. Nees fig. 113.
- 5.—*Trichia serotina* Schrad. Schrad Journal, 1779, t 3, fig. 2. Leigh Woods, Bristol. H. O. Stephens, Esq.
- 6.—*Trichia cerina* Ditmar. Sturm Deutschlands, fl. I., t 25. Batheaston, on rotten stumps.
- 7.—*Trichia nigripes* P, Bull t 417, f. 2. Common.
- 8.—*Trichia chrysosperma* D.C. Bull t 417, f. 4. Common.
- 9.—*Trichia turbinata* With. Sow t 85. Common.
- 10.—*Trichia flagellifer* B and Br. "Annals of Nat. Hist.," No. 1,143, t 2, fig. 4. Out of 14 British species we can claim 10 of this genus.

* *Ophiotheca*, from *Ophis*, a serpent and *theke*, a receptacle, alluding to the flexuous peridium.

† *Trichia*, from *thrix*, a hair.

GENUS 94. PERICHÆNA.* FR.

Peridium simple, submembranaceous, persistent, naked, often splitting horizontally in the middle. Flocci few, not spiral.

- 1.—*Perichæna quercina* Fr. Syst. Myc. III., p. 192. On ash trees, Batheaston.
- 2.—*Perichæna populina* Fr. Grev. t 252. On fallen poplars, Langridge. We have 2 out of 3 British species.

GENUS 95. LICEA.† SCHRAD.

Peridium thin, membranaceous, even, bursting irregularly, spores not mixed with flocci.

- 1.—*Licea fragiformis* Fr. Grev. t 308. Bowood. On very rotten wood.
- 2.—*Licea applanata* B. Batheaston, on sloe bushes. Berk, in "Hooker's Journal of Botany," IV., p. 67. Two out of four British have occurred here.

GENUS 96. PHELONITIS.‡ Chev.

Peridium papyraceous, persistent, commonly splitting horizontally in the centre. Spores large, rough. *Phelonitis strobilina* the only British species grows on fallen fir cones. It has not been found in this district.

From the foregoing list it appears that only 45 species have been found in this district out of 103 recorded as British in Mr. Cooke's Handbook. Much, then, remains to be done, although many species which occur on fir wood, especially in the old Scotch forests, can scarcely be expected here. Another reason for the paucity of our numbers arises probably from insufficient data to go on. I mean the paucity of good figures, especially of minute details, which is essential to the determination of plants so diminutive and nearly related in the present state of natural science.

* *Perichæna*, from *peri* around, and *chæno* to gape.

† *Licea* of uncertain origin.

‡ *Phelonitis*, perhaps from *phainoles* a cloak.

Note on the Occurrence of the Land Planaria (Planaria terrestris) in the Neighbourhood of Bath. By the Rev. LEONARD BLOMEFIELD, M.A., F.L.S., &c., President.

(Read February 11th, 1874.)

This animal, which henceforth may be included in the Bath Fauna, though small and insignificant in appearance, is of much interest from its being the only species of Land Planaria found in West Europe, so far as at present known. It was first discovered by Muller, in Denmark, and described by him in his "*Vermium Terrestrium et Fluviatiliū Historia*," published in 1774. Though apparently common in this country it had been entirely overlooked by British Naturalists previous to 1846, when it was found by myself in damp woods in Cambridgeshire, and some account of it published in my "*Observations in Natural History*."* Since then it has been found in Kent by Sir John Lubbock, who, not aware of my notice of it, brought it forward as new to Britain in a communication to the Linnean Society, in 1868.† It has been also found in Shropshire by Mr. Houghton. To Dr. Bird we are indebted for the knowledge of its being an inhabitant of the Bath district. It was during the time of his being engaged in making a collection of the land shells of this neighbourhood for the Local Museum at the Institution, that I drew the attention of that active member of our Club to this animal, thinking it probable it might occur about Bath in similar situations to those in which I had met with it in the Eastern counties, and such proved to be the case; for he very soon afterwards brought me several specimens obtained in woods on Lansdown and in other localities. It secretes itself under stones and rotten wood, on which last it was thought by Sir John Lubbock to feed. But I am more inclined myself to

* Under the name of *Ground Fluke*, p. 315.

† Journ. Linn. Soc. (Zool.), vol. 10, p. 193.

believe it to be carnivorous, making a prey of the smaller land Mollusks, especially those which reside in the same damp situations as itself ; as I have stated in my account of it referred to above, and where will also be found a description of its external characters.

Though this species of Land Planaria is the only one known in western Europe, there are several other species found in tropical regions, some of much larger size than our British one. Darwin met with them in South America, about Rio de Janeiro, "one specimen being no less than five inches long." He afterwards observed them in New Zealand, Van Diemen's Land and the Mauritius. Some of the New Zealand specimens he kept alive for nearly two months, experimenting upon their power of reproducing lost parts, which they possess to a great degree,* and which is also the property of the fresh-water species of Planaria, a considerable number of which are found in great Britain, in our ponds and ditches. I would suggest, in conclusion, that some member of our club take up the study of these last, and ascertain how many are to be met with in the Bath district, and what are their respective habits.

Summary of Proceedings of the Bath Natural History and Antiquarian Field Club, for the year 1873-4.

MR. PRESIDENT AND GENTLEMEN,

In preparing a summary of our proceedings for the past year, one fact has to be put prominently forward—the disproportionate share of attention bestowed on Archæology by Members of a Natural History as well as an Antiquarian Field Club. The investigation of the Natural History and Geology of the neigh-

* Journal p. 31.

bourhood seems to be made quite subordinate to that of the Antiquities, if not well nigh neglected altogether. To you, Sir, who were one of the founders of this Club, which was originally started for the purpose of Botanical research, this comparative neglect of one of its first objects must be a source of regret. The defect might perhaps be remedied if Members who take a special interest in Natural History and Geology would ascertain before hand that the candidates whom they propose for admission to the club are interested in one or other of these pursuits, and that their object in seeking admission is not merely to join in the weekly walks. It might also be a subject for future consideration whether it be not advisable to divide those who join the walks and excursions into sections, each under the direction of a member especially devoted to that section, whether of Natural History, Geology, or Antiquities. With these introductory remarks, which seem especially necessary to those who watch the welfare of the Club, let me at once proceed to summarise the proceedings at the evening meetings. The attendance during the last session at these meetings has much increased owing to a wise and liberal permission to attend granted to all the members of the Literary and Scientific Institution, and friends who may have a Rota presented to them which acts as a card of admission. This permission has been largely taken advantage of, and a fair audience has generally been the result. The usual conversazione on March 12th concluded the session of 1872-73, when several communications were made; the first was by Mr. Emmanuel Green, on Samuel Crooke, Rector of Wrington, a man of considerable mark in his day (*vide page 1*); this was followed by the 'Copy of a letter dated 22nd Aug., 1800, from Mr. Stephens, of Camerton, to Mr. Davis, of Longleat, on the subject of Diseases in Wheat,' with 'Remarks by the President,' communicated through the Secretary. Mr. Ekin and Mr. Goodwin took part in the subsequent conversation, which turned mainly upon the origin and remedy

for the 'rust;' most abundant, said Mr. Ekin, on poorly farmed lands, as certain diseases are in debilitated animal bodies. Major Chandler, through the Secretary, contributed a letter written by William Cobbett, in 1808, to Mr. Lee, of the Elms, Kingwood, Major C.'s grandfather, respecting the summons sent to one Dean, then in the service of Cobbett, to attend a ten day's drill at Southampton, and the insinuation that the object of mounting the volunteer Dean on Mr. Lee's horse was to evade the horse duty. Cobbett further takes occasion from this to deliver his peculiar views respecting the militia and the land laws.

Dr. HUNTER having then left the chair brought the meeting to a close by reading a carefully written paper upon "Gold and Silver Wares: their Standard Marks," of which the following is an abstract:—

'In England minting was a royal privilege, and wherever the king travelled his moneyers would accompany him and issue coin. Sometimes the king deputed the privilege, and we can now count about a hundred places in England from which royal money has issued. There are two in Gloucestershire—Berkeley and Gloucester; six in Wiltshire—Bradford, Cricklade, Wilton, Malmesbury, Marlborough and Salisbury; seven in Somersetshire—Bath, Bristol, Taunton, Watchet, Crewkerne, Ilchester and Glastonbury. At Bristol money was minted so late as the great coinage of William III., and it may be recognised by the letter B below the head.

At very few of those places were there artisans competent to make silver vessels or ornaments. Among the early parliamentary representatives of Bath is one called Le Goldsmith, and this fact is suggestive, but no more. Thus, though we had honest moneyers everywhere, we had few artificers in metal goods beyond the city of London, and it was there that the assaying of metals used in the arts, and the giving their purity a warrant by stamp, was first introduced. It has been long known that pure silver

is too soft for ordinary wear and tear, and the Government has always recognised the admixture of a small quantity of copper *à la loi*, or, as we now say, alloy, for a hardening purpose. In 1238 the relative quantities of copper and silver for goods were first regulated by statute of Henry III., and the proportion recommended by long experience, then and now prescribed, is 925 parts pure silver and 75 of alloy.

In 1300 the regulation of assay for all England was delegated by King Edward I. to the Goldsmith's Company of London, and the crowned leopard's head was then first stamped, as it is now at the end of five hundred and seventy-two years.

The next statute affecting the matter was a blunder, for it forbade what we now call "silver plating." This was in 1327: the statute had, of course to be modified, but it was not till 1742 that silver plating revived in Europe.

Proceeding with our chronology, in 1397 a statute was passed to associate the mayors of towns where silverware was made together with the incorporated goldsmiths, to prevent the latter from combining against the public. The mayor was directed to mark his approval of the metal by stamping the badge or arms of his city or borough. In 1423 a statute enumerates seven provincial offices established to save the cost and risk of conveyance of goods to London. The offices were at York, Lincoln, Newcastle-on-Tyne, Norwich, Bristol, Salisbury and Coventry.

In 1462 Chester and Exeter seem to have been added as a charter of the London goldsmiths gives them power to inspect the process at both these places. "Her Majesty's Lion," as he is called, is first found upon plate in 1545. He is the English lion passant gardant, and he is mentioned as in use by a statute of 1597, but the exact date and origin of his appearance is not ascertained. This general 'standard mark' is put on next after the private mark or initial letters of the maker of the ware. In Ireland this standard mark is a harp, and in Scotland two

standards are used ; the one, a thistle, is stamped at Edinburgh, the other, a lion rampant, at Glasgow. The next mark, or 'Hall mark,' denotes the district-office, of which there are nominally ten in the three kingdoms. For London the leopard's head with a crown on. For the other cities their arms were directed by the Act of 1700 to be the marks ; for York, five lions and a cross ; for Exeter, a castle with two turrets or wings ; for Chester, a dagger between three wheatsheaves or garbs—a device which was formerly impaled with a shield of three lions passant—too complicated a figure to be reproduced on a small plate mark ; for Newcastle, three castles ; for Edinburgh, a castle and lion ; for Glasgow, the picture of a tree, salmon, bird, ring and bell ; for Dublin, the figure of Hibernia. Of these old English marks all are very rare except the London and Chester, which last includes the great watch factories at Liverpool. Birmingham and Sheffield, which now stand next to London, are of more modern creation, dating from 1772. The mark of Birmingham is an anchor, and that of Sheffield a crown.

The next figure is the duty-mark, indicating the receipt of duty, and this is the head of Queen Victoria, or of the reigning sovereign. All makers pay duty and are registered, and their work is assayed by the office. The assays of gold are proved by counterpart at the royal mint once a year. Duty was paid very early in the eighteenth century, if not before, but the king's head was not struck till 1784. It is a permanent mark, and may it be long before we have to change it !

In 1697 an unwise Act softened the standard metal and changed for a time the stamps. It orders that silver of a superior purity shall be used, and that to distinguish the new quality from the old the leopard's head shall no longer be used, and that a lion's head erased and a figure of Britannia shall take its place. This Act, so far as it affected silver, was repealed in 1720. When it was passed it was related that all the provincial offices were dead. They had always been of inferior credit to London, because

buyers did not recognise their marks and looked for the leopard's head. The Act of 1700 recreated the offices at York, Exeter, Norwich, Bristol and Chester, and in 1702 Newcastle was again revived. Bristol never took any action in the matter, and Bristol wares are not known to exist. Norwich, known by its castle and lion, has long been dead. York died out in 1772, but has since revived into a weak existence. Exeter, known in old times by a crowned X and now by a castle with wings, is still working on a small scale. Chester, which did not use the present mark till 1775, is still busy with the watch trade. In 1772 an Act for erecting the great offices at Sheffield and Birmingham says that no offices were then in existence except London, Chester, Exeter and Newcastle. There are, however, some curious old marks which inquirers have not yet been able to assign to any certain place, and they may have been rather maker's marks than assay marks. There are several of these in the West, a few are assigned by some collectors to Exeter, one to Barnstaple, and one, a T and a tun, to Taunton. This last is more likely to be the mark of a maker at Taunton than of a public assay, the seal of the ancient and extinct Corporation of Taunton bearing, as so many others do, the figure of a castle. These rare marks are very valuable. It is not difficult to guess how work of this sort came to be established at Taunton and Barnstaple, for in the sixteenth and seventeenth centuries the miners along the north coast of Somerset and Devon, and particularly about Combe Martin, made occasionally what would now be considered enormous finds of silver. To this English silver, wars and shipwrecks and more regular commerce through Bideford and Exeter, must have added a considerable quantity.

I have now given you certain rough land-marks by which to know the places and dates of your silver wares. From 1697 to 1720 you remember the leopard's head was suspended in favour of Britannia and a lion's head. In 1773 the Birmingham anchor and the Sheffield crown are first found, and in 1784 the king's

head was introduced. A much more exact means of ascertaining the age of the wares is, however, obtained from the 'date mark,' which is a letter used in alphabetical order in repeated and varying series. The series doubtless commenced with the first charter of the goldsmiths in 1327, at least we know that one was current in 1336. The series in use in London are of twenty letters from A to U, omitting J. Other offices have not been so orderly in the cyclical succession of series. People who are used to the subject rarely mistake the series, and at least four centuries or twenty variations of the London alphabet are known. The year begins on May 20th, and in 1716 the alphabet happened to begin with a Roman capital A, and Roman capitals were thenceforth used for forty years in two series. In 1756 a change was made to Roman smalls, in 1776 to old English capitals, in 1796 to Roman capitals again, in 1816 to Roman smalls, in 1836 to old English capitals, and in 1856 to small black letters or old English for the first time. By this arrangement the alphabet is spread out in four variations over eighty years. In 1876 a new series will probably be introduced, when, unless italics are used, we must, I suppose, go back to the old Roman capitals of 1716 and 1796. An expert eye can usually perceive differences in the character of the lettering if not of the wares, which assures one against any confusion of the series; there is, however, a resemblance between one alphabet of Queen Elizabeth and one of Charles II., which a very sharp and experienced eye in Bath finds difficulty in overcoming.

The provincial date-marks are in sad confusion. The crown and date were at first stamped at Sheffield as one mark, the Sheffield date-mark was until 1842 a letter taken at random, and thus the date could be ascertained only by a reference to the register. The Birmingham letters are 26 in number and run from 1772 in alternate series of Roman and old English lettering. The provincial series of letters then do not agree with the London, they vary and are too complicated for oral explanation. The

London office does about ten times as much as any other, the Sheffield is second in silver, the Birmingham in gold ; the smaller offices have always had a very precarious existence.

With regard to gold wares, the difference from silver is in the standard-mark, which, instead of a lion for England, is a crown, to which is added figures denoting in carats the proportion of pure gold in the article. There is the leopard's head too, but dis-crowned by George III., and for Birmingham, or other provincial office, its own mark. The scheme is that absolutely pure gold is called twenty-four carats fine, and every part of alloy, that is of baser dilution, brings down that number. You often hear of the best gold ware that it is twenty-two carat gold, that means that twenty-two parts out of twenty-four, or eleven twelfths are pure gold. A very common figure is the crown and 18, in one stamp or two, this indicates three parts of pure gold and one fourth of alloy, usually of silver or copper according to the colour desired. Be never deceived by the colour of gold ; articles, even sovereigns, are, after completion, dipped in acid, by which the alloy is melted out and a face of gold, pure but as thin as gold leaf, is left wherever the eye can reach. And be not deceived by the standard crown, for this is now by modern statute so degraded that it may be impressed on any rubbish that may come within the term gold of eight carats, that is, a mixture containing eight twenty-fourths or one-third of gold. Those who have caught my meaning will know that neither colour nor crown will afford protection to a buyer ; he must read the figure and remember that twenty-four is the fixed number, and that the figure impressed represents the proportion of pure gold in twenty-fourths. The low number or qualities are all modern. In 1798 the only quality marked with the crown was 18 ; in 1845 the crown with 22 was introduced, and the rest later. As to articles of less than eight carats, it is a fraud to call them gold at all ; they carry not even the crown, and yet in this wicked generation nine-tenths of the gold jewellery or trinketry is of this base quality.'

The session commencing Nov. 12th, 1873, was opened by an address from the chairman on Topography (*vide* p. 43). Mr. Skrine, in proposing a vote of thanks to Dr. Hunter for his valuable contribution to an original and philosophical treatment of the subject, asserted the usefulness of small parochial efforts in this direction, and thought that in many instances there might fairly be an attempt to commence a Topographical History earlier than the period of the Domesday book. During the discussion a complimentary allusion was made to Mr. Skrine's effort in this direction, in his 'Sketch of the early history of Bathford and its neighbourhood.'

A special evening meeting was held on the 26th Nov. for a promised communication on local geology; as the Member who had undertaken this was unable to be present, Mr. Braham very kindly came forward at a short notice to supply his place with some *vivâ voce* remarks on Electro-Metallurgy. Commencing with an elementary description of chemical affinity, he stated that electricity about which so much had lately been discovered was but still in its infancy, and very much had yet to be known about it. With regard to the important question, 'What is metal?' the answer that it is an element with certain properties, *i.e.*, malleability, ductility, and metallic lustre, was not by any means a satisfactory definition. Various experiments were then made to show the analysis of water by operation of metals undergoing oxydation and consequent evolution of heat and electricity. The decomposition and recomposition of water, the action of the current on binary salts and the process of electrotyping were illustrated. Electro-plating and gilding were explained, and several coins coated with the precious metals. The crystallization of metals by electricity was shown in action under the microscope, and attention was called to the similarity of the forms produced to those found in metalliferous veins known as native metal. A vote of thanks was passed to the lecturer for his experimental illustration of so difficult a subject, and the chairman (Dr. Hunter),

Messrs. Barrett, Winwood, and others, took part in a discussion as to the very important question of the deposition of metals in mineral veins. The general view maintained was that a very great proportion of these mineral deposits was derived from the waters of the Ocean, but whether their localization in certain fissures and veins was due to electrivity or not was still involved in much obscurity, though the lecturer certainly inclined to the latter view that electricity was the main agent. The absence of Mr. Charles Moore through indisposition was much regretted, as he was known to have lately strongly upheld the Wernerian view that the fissures in our neighbouring Carboniferous Limestones have been mineralized by Oceanic waters.

On Dec. 17th, a very encouraging gathering of Members, Ladies, and Visitors, took place attracted principally by the prospect of hearing Mr. Chas. Moore give his reminiscences of the Natural History and Geology of Mentone. The first portion of the Evening was given to Mr. Emmanuel Green, who read a paper on 'Some Excommunications and Public Penances in Somerset,' at the time of Archbishop Laud's endeavour in 1633 to revive the judicial independence of the Bishops.

A vote of thanks was proposed by Colonel Taylor for Mr. Green's clear account of a troublous period; and the Rev. De Courcy Meade in seconding the same inaugurated a discussion upon some of the points alluded to in the paper, such as the position of the minister at the Communion Table, a subject which has lately given rise to some correspondence in the journals and elsewhere. The paper will be printed in the next number of the Proceedings.

Mr. Charles Moore occupied the remaining portion of the evening with an account of his recent visit made last winter to Mentone in search of health.

He introduced his subject with an allusion to the way in which railways annihilate distance, and the delightful change from mid-winter to

summer temperature which a two day's journey so easily affects. The geology of the early portion of the road was not very varied and of little interest; after passing Marseilles, however, the district claimed more attention from the geologist. Shut in as Mentone is by a fine range of mountains of Jurassic age, reaching to 4,500 feet, with only a narrow breadth of land between them and the sea, the physical characters of the place must necessarily greatly influence its botany and natural history. The subject of the evening's communication, i.e., 'Reminiscences of Natural History and Geology of Mentone,' was then at once entered upon. The contrast in the growth of the olive trees—but stunted shrubs in the earlier portion of the journey; in this sheltered bay, fine luxuriant trees, some of them supposed to be as old as the Roman period—the rich orange groves, and the extreme variety of the botany, the latter so well worked out by Mr. Moggeridge—were touched upon. Mr. Moore dwelt long upon the many interesting facts connected with the zoology of the place. The absence of small birds, accounted for by the perpetual raid carried on against them by the native gunners; the abundance of reptiles and of insect life; the startling noises of the tree frogs; the persevering industry of the *Scarabæus*, a large flat beetle, in rolling or pushing her earth ball to a suitable place, wherein to deposit her eggs; the harvest ants, *Atta barbara* and *A. structor*, and their power of stopping the germination of the various seeds laid up in their granaries for winter use; the curious attempts at lassoing a certain ant by the small hunting spider; and the extraordinary instinct, if not something higher, of the trap-door spiders, familiar to the readers of Mr. Moggeridge's book, especially the *Nemesia meridionalis*, which for greater security, not only forms an outer, but an inner door to its tube excavated in the earth, and when pursued draws this second door across that portion of the tube in which it has taken refuge, and by placing its back against it firmly resists any attempt to open it. Before giving a description of the skeleton of Mentone, Mr. Moore repeated an anecdote relating to a dog, which the owner and landlord of the Victoria Hotel had presented to a lady leaving the hotel on her homeward journey to Vienna, and which, after six weeks' absence, returned one day to the hotel door, having traversed a distance of 600 miles. From the exhaustion of the journey the poor animal died within twenty-four hours after its arrival. With regard to the discovery of the skeleton, or rather the two skeletons (for a second has since been found), Mr. Moore gave a minute description, as he was fortunate enough to see it himself before it was removed by the discoverer, Dr. Riviere, to Paris. In the limestone range of hills just outside the French frontier are

a series of five caverns facing the south. A platform runs at about 100 feet above the Mediterranean, and these caverns are about 40 or 50 feet higher up in the side of the Jurassic hills. In one of these called Baoussé Roussé the skeleton was found at a depth of about eight or ten feet below the surface, with an equivalent depth of soil below it. The whole floor, which has never had a stalagmitic covering formed over it, is one mass of sand and charcoal. Broken bones and thousands of flint flakes have been collected from it. From the fact of its being the only skeleton found entire in association with remains of mammals considered extinct it is of great importance. Dr. Riviere would carry the date back to the times of the extinct mammalia, but Mr. Moore questioned whether he was right in placing the date back so far: it was, however, without much doubt, of considerable antiquity. Amongst the interesting objects Mr. Moore exhibited, in addition to the hiding places of the trap door spiders with their flexible hinges, were flint flakes, rounded stones, and whetstones from the cavern, together with a small portion of specular iron ore found near the jaw of the skeleton, probably either placed in the mouth or worn suspended to the neck as a fetish or charm. The head was surrounded with a chaplet of strung shells and teeth of animals, and bracelets of similar remains were still surrounding the bones of the limbs.

A cordial vote of thanks was passed to Mr. Moore for his interesting reminiscences, and a feeling of admiration expressed at the profitable way in which a man with a keen eye for nature's wonders, though he be an invalid, can spend his time and cheat the English winter.

Mr. WINWOOD called attention to many facts in connection with these Mentone researches which tended to make Englishmen cautious as to their conclusions respecting the great antiquity of these skeletons. Two especially he dwelt upon; 1st, the important fact that there was no stalagmitic floor above the skeleton; and 2ndly, the great probability that from the position in which the skeleton was found the earth in the cave must have been disturbed for the purpose of covering it after death. Mr. Winwood was unable to give his 'Notes on some Railway Sections,' owing to press of time, and merely alluded to the admirable water-colour sketch of an important section of sands resting upon the upper lias in the Lyncombe cutting made for

him by Mr. Aspland. From these sands he had lately obtained fossil evidence, which he thought would help to decide the question whether they are to be placed with the Oolitic or with the Liassic series.

The Evening of Jan. 14th, 1874, was set apart for the Revs. Prebendary Scarth and H. N. Ellacombe; the former read a short paper on 'Ancient Mining in the Mendips.' Commencing with the subject of Roman Mining generally, the implements they used, and the numerous traces of their industry left behind them in England; he gave a minute account of the various 'pigs' of lead, their weight, inscriptions, and the localities where they have been found, and then proceeded to describe the late important discoveries at Charterhouse, on the Mendips. In concluding he suggested that Wokey Hole, near Wells, was an ancient Roman lead mine.

Thanks were returned for Mr. Scarth's paper, and the Club was congratulated on having an Archæologist in the neighbourhood so well able to take notes of these important 'finds.'

The Chairman called attention to the absence on these "pigs" of lead of any names calculated to advance the topography of this neighbourhood; the names of the Roman Emperors, which alone occur, being of little use for that purpose.

Mr. Winwood took exception to one statement only in Mr. Scarth's paper—*i.e.*, that the formation of Wokey Hole was chiefly due to the mining enterprise of the Romans, and argued, both from etymological and geological reasons, that this could not have been the case.

The rest of the evening was spent in listening to a very neatly written paper by Mr. Ellacombe, on 'The Daisy; its History, Poetry and Botany,' of which the following is an abstract :—

The subject, though apparently insignificant, fairly falls within the province of a field club. As to its name, no better can be suggested than

Chaucer's derivation of the 'Day's Eye.' Three legends are assigned to the origin of the daisy—one by Chaucer, that Alcestes was turned into a daisy; the second a pseudo-classical one, given in Philip's *Flora Historica*; the third a Celtic one, given by Lady Wilkinson and Mrs. Lankester. The poetry of the daisy commences with the deep love for the daisy shown by Chaucer in many well-known passages. It was celebrated by Hawes (temp: H. VII.). It is mentioned by Shakespeare only four times in the plays and once in the 'Rape of Lucrece.' It is barely mentioned by Milton. There are a few good notices of the flower in Herrick but none in George Herbert. It is almost entirely overlooked by the Poets of the first half of the eighteenth century; but after being brought into notice by Burns, is very lovingly sung of by Clare and especially by Wordsworth. Since his time almost every Poet has sung of the little flower down to our own day. The botany of the daisy is interesting as a good specimen of the great family of the Composites. The method by which its ovary is fertilised is especially remarkable. It produces double flowers and the curious Hen and Chicken daisies, which give an excellent example of the interchangeable identity in all parts of a flower. The daisy is used in painting, (especially among the early Italian and Flemish painters), in Architecture and Heraldry. In medicine it has not the same powers that it once seems to have had, but it still holds its place as the favourite flower of childhood.

The last evening meeting before our anniversary was held on 11th of February, when Mr. Broome, well known in the mycological world, contributed some notes on 'Fungi found in the neighbourhood of Bath' (*vide* p. 63). The presence of our President, who was able to take the chair, was a subject of congratulation. With a few preliminary regrets as to the necessity of his enforced absence from the evening meetings on account of health, he introduced Mr. Broome as the best botanist in Bath, and lamented that so few of the Members took an interest in this study.

A discussion followed, in which the President and others took part. The former alluded to the importance of the study of fungi in connection with the potato, vine, and silk worm diseases; and touched upon a prevailing opinion that all our epidemics were due to the germs of animal and vegetable organisms always

present in the atmosphere, and under conditions favourable for their development giving rise to various forms of disease ; and, with special reference to these low forms of life, he asked, 'Whether we have not here approached nearly to the confines of life itself by two gradually descending lines ; by the one, through man, the highest form of animal life, to monads ; by the other, from the highest form of vegetable life, to fungi, the two meeting at a point where there is but little distinction between organic and non-organic substances ?' Various interesting questions cropped up during the evening, *e.g.*, whether any volatile oil has been found in fungi ; the importation of various destructive insects from America, especially the beetle that attacks potatoes, whose approach from over the water we are all dreading, &c. This was succeeded by Mr. Blomefield's remarks on the *Planaria terrestris*, the so-called 'Land-leech.' Belonging to the invertebrate division, it is classed among the Entozoa, and was first discovered in Cambridgeshire by Mr. Blomefield in 1846 ; since then Sir John Lubbock has found it in the woods of Kent ; subsequently one of the members of the Club, Dr. Bird, found it in our own neighbourhood. Several interesting details were given as to its food and habits, especially its power of extraordinary reproduction of itself by division. And as a cognate subject some remarks were made respecting the leech of commerce, which was stated to consist of two distinct species, the *Hirudo officinalis*, a foreigner, and the *H. medicinalis*, formerly abundant in England in the Eastern counties, though now, in consequence of drainage, comparatively rare. At present the supply of leeches for medical use is entirely from abroad, consisting chiefly of the *H. officinalis* which seems to be more and more taking the place of the other species in the chemists shops. The Rev. Prebendary Scarth, who had taken the chair, thanked the President for his extremely useful and clear account of this comparatively small but important little animal. There being still a few minutes to spare Dr. Hunter concluded the

evening by giving an account of Dr. Tobias Venner, the author of the '*Via Recta ad Vitam Longam*.' He shortly related what could be collected of him from printed accounts, and gave the contents of his will (*vide p. 11*), and some notice of the Parker family of Bath and Widcombe.

EXCURSIONS.

All the four Excursions were successfully carried out with the exception of the one fixed for Wardour Castle; this owing to some unknown cause, probably the distance, appeared to be viewed in an unfavourable light by the Members, as the Secretary received only two names of those willing to join.

The first took place on 13th of May to Goblin Combe and Butcombe, when bright May weather favoured the twenty Members who took the train to Yatton. A somewhat dusty walk through the rather monotonous village street tended to make the short cut across the fields all the more agreeable. Cleeve Toot, a Mountain Limestone peak which guards the entrance to the Combe, had been a prominent object for some time, the gray colour of the rock contrasting so picturesquely with the fresh light green of the spring foliage. The origin of the word 'Toot' was the cause of considerable discussion. The meaning of the word is plain, says one; there is a 'Toot hill' in Yorkshire, and from its commanding position a horn was blown from its summit to call the cattle together. A veteran Orientalist added his support to this idea by stating that 'Tutree' (spelt thoothooree) was the Ordoos or camp language for horn. This may be called the 'bow bow' origin of the word. Another derivation was from the word 'Toot,' the root of the Hindoostanee verb 'tootna' to break, 'toota' broken. And yet was there still another theory which came with the weight of a great authority, that the word 'Toot' was derived from the Latin name of Mercury *Tutates*; that the Romans were accustomed to place images of Mercury, their Tutelary god of heights, on places like the one in question, and

that this word 'Toot,' or Tot, was connected with heights generally. This may be called the Anglo-Romano theory.

Some of those who were accustomed to hear similar exercises of the imagination to account for the derivation of words were content to wait until etymology had asserted its right to stand upon some surer scientific basis, and plunged from the discussion into the delicious shade of the trees. The Combe with its steep northern face of Mountain Limestone, and its easy southern slope of the same formation is very like that of Brockly, indeed far surpasses it in varied contrast. The same mingling of rocky crag and many coloured foliage is common to both in their lower parts, but Brockly lacks the fine upward prolongation into the wild and broken ravine, which is perhaps the finest part of Goblin Combe. Numerous halts were made to admire the rich freshness of the colours all around, whether in the foliage of the many trees that clung to the precipitous rocks, or the more humble wild flowers that carpeted the woods in all the freshness of their springtide dress, or with a view of unravelling the cause which made the busy 'pismires' in an ever passing and repassing line seek the topmost boughs of a young ash tree, whose buds were just then opening to the powerful rays of the sun. At length a wall which divided the more wooded portion of the Combe from the rest barred further progress; a friendly gap however was rendered easily surmountable by a ladder which the kindly consideration of Mrs. Castle of Cleve Court had provided for the infirmities of the more heavily weighted of the Members, and the walk was continued through scenery of increasing wildness, bearing evidence on all sides in the thickly strewn blocks of angular and subangular limestone of the vast power of atmospheric wearing away; the lines of weathering, which chequered the fallen masses and presented an appearance of contraction by heat, plainly marked the process that had been going on before these blocks were detached from their parent beds. After passing the spot where the Members crossed over last year from Brockley Combe to

Wrighton, and turning an angle, the two sides close in and become more precipitous, forming, perhaps, the finest part of the whole. Still farther on where the Combe branches off to the right and left, immediately at the point of bifurcation, the secretary pointed out an exposure of Trap rock; but reserved his remarks thereon until the Members had reached the head of the Combe under Broadfield House. The party increased by several visitors, and by the presence of the Vice-President of the club, who had joined them during the morning's walk, were not disinclined to rest for a space near a section of the Old Red sandstone, whilst the Secretary took advantage of this, and with the geological map fastened to the stem of an oak tree delivered himself of a few notes on the geology of the district.

Having recapitulated what he had stated last year as to their having crossed to the western edge of the Bristol Coal basin, and that Broadfield Down, an isolated mass of Carboniferous Limestone, was one of the western boundaries of this basin; he spoke of the exposure of Trap which the Members had passed over in the morning. The question naturally arose, was it intrusive? i.e., had the igneous rock been injected into a fissure of the Limestone; or was it interbedded? i.e., had the fused mass originally burst forth and spread over the surface, and been subsequently covered over by more recent deposits? From the appearance of the Limestone rock, a specimen of which he held in his hand, the Secretary considered it was intrusive, and had altered the strata into which it had originally been injected. In this case the Trap was of subsequent date to the Limestone, and could not have been the cause of the disturbed character of the beds in its vicinity, but had been poured forth into the joints and fissures caused by the same disturbing force which had produced the anticlinal folds of Broadfield Down and the Mendip Hills. The similarity of the structure of the two was then touched upon. On a former occasion (*vide* Vol. II, No. 4, p. 485) he had stated that the Old Red Sandstone beds were unexposed on Broadfield Down. Since then and during a walk with one of the members of the Club in search of a second exposure of Trap farther up the Combe, he had found that section of Old Red near which they were sitting; it however was laid down on Mr. Saunders map, a copy of which he had not previously seen. This, then, evidently formed the nucleus of Broadfield Down, as it did of the Mendips; the Mountain Limestone

dipping away from it on each side as slates from the ridge of a roof. There was also another similarity, the common occurrence of Trap in both. Our Member, Mr. Charles Moore, considered the 'Basaltic dyke' which he had discovered running across the Mendips as the agent of the local disturbance there; but he (the Secretary), whatever might have been the case in that latter range of hills, could not hold the opinion that the upheaval of the mass on which they then stood was the result of the outburst of the igneous rock they had visited in the morning, but that it was due to other causes. Some of these causes were then alluded to, and as a matter of course the much disputed origin of ravines came in for discussion; the Secretary inclining to uphold the more modern theories; the Vice-President holding more with the Ancients and attributing the hollowing out of this and such like places to the sudden upheaval of the land from a primæval Ocean, and the consequent rush of waters from the surface, excavating and tearing down the rocks during its progress.

The SECRETARY having thanked the Members for their patient attention, the walk was resumed still up the Combe, which nearing the summit of the Down began now to lose its wildness, and presented the form more of a water course than a ravine, until the Darlington Arms, at Redhill, received its hungry guests not at all unwilling to do ample justice to the good and plain fare placed before them. After lunch Mr. Scarth read a paper on the Tumulus at Nempnett now destroyed. (*Vide* p. 20.)

The SECRETARY, in returning thanks to Mr. Scarth for his paper, took the opportunity of assuring the Vice-President and Members that their representation to the authorities of the Cotteswold Club respecting the need of arresting the destruction of the Uley Tumulus had been attended with the happiest result, for at the annual meeting of the latter Club he was gratified to hear the president, Sir W. Guise, state in his address that due attention had been paid to the representation of the Bath Field Club, and that the necessary repairs had been carried out. As time was on the wing the programme for the day was necessarily shortened, and the visit to the site of the Nempnett Tumulus postponed. The pretty little Church of Butcombe, however, was visited, some of the Members walking across the fields to it under

the guidance of local friends who had joined at lunch time ; others rode in the 'break' to the top of the hill, and dropping down the lane on foot passed on the way a clear and limpid well, called 'Clive Well,' and thus spoken of in the ancient register of the church (1692):—

About the year 1360 Hathewisia, daughter of the famous Gurney, of the court at Barrow, confirmed her father Robert's grant to Alexander de Budicombe of lands in Budicombe, near Clive Well, for his service in the field of Cressy, August, 1346. (*vide* Court Rolls at Barrow.)

When all had arrived in the churchyard and had disposed themselves, some under the shade of the fine yew tree, others on the weather-stained steps of the old cross, the Rector of the parish, the Rev. W. H. Cartwright, gave extracts from the old Parish Register, and has kindly given permission to the Secretary to print them in full (*vide* p. 25).

Due thanks having been given to the Rector for his concise and interesting account of the Parish and Church. A rapid ascent of the hill was made to the 'break,' and the Members were driven past the extensive reservoirs of Barrow to the Bristol station in time for the 6.40 p.m. train.

Excursion to Wells and Wookey.—It was thought more convenient to go to Wells by road than rail. A 'break' with four horses and a carriage and pair therefore received the Members in the front of the Assembly Rooms on the morning of June 10th. The monotony of the long four-hours' drive was varied by some occasional remarks of the Vice-President, who called a halt at the top of the first hill to point out where the Wansdyke crossed the road in the direction of Englishcombe ; reminding the Members that it was the same dyke which they had seen during one of their former excursions in Savernake Forest, and which formerly extended probably from the Thames on the east to the Severn on the west ; well seen on the Wiltshire downs near Avebury, traced across our own downs at Hampton Rocks, appearing again near the Cross Keys in a field to the west of

the church at Englishcombe, and again at Stantonbury. Arrived opposite the tumulus on the left hand of the road and just before the descent of the hill into Radstock another short delay took place, when Mr. Scarth described how Mr. Skinner, of Camerton, had discovered remains of Roman villas in the neighbouring fields, and founded upon the great abundance of these remains his ingenious theory that this was the site of the ancient Camulodunum; a view sufficiently refuted by Sir Richard Colt Hoare, who Mr. Scarth considered to be correct in placing it at Colchester (*vide 'Som. Arch. and Nat. Hist. Soc. Proceedings,' Vol. XI. p. 186.*) The date of the third cent. was given because Roman coins of that period had been found here. Nothing further on the road is worth recording, unless it be that the fine view from the Limestone ridge as you descend the hill into Wells was veiled in the distant rain which had already wrapped Glastonbury Tor in haze, and was fast coming over the Moors to give the usual welcome to those who visit the city of many waters. After a little refreshment at the Swan Hotel, the serious business of the day commenced. Mr. Irvine was ready to take the members under his guidance, and at once gathered a listening audience around him as he launched directly into the mysteries of the richly-sculptured West Front as it rose tier upon tier with its storied niches.

The West front he considered to be oldest portion of the existing Cathedral and to have been the work of Reginald Fitz Jocelin, who was Bishop from 1174 to 1191. With regard to the date of the North and South Towers, he was of opinion that the upper part of the South Tower was the oldest of the two, and was said to be the work of Bishop Harewell, between the years 1366 and 1386. The North Tower being a copy of the other and some 50 years later in date, about 1426. The figures in the early parts were, of course, of later date than the Architectural details, and were the fruitful source of much controversy, the design seemed to be the following:—The first row represented the Seculars connected with the Cathedral. Then came the Bishops as a rule on the South; Kings and Princes who had been benefactors to the See being to the North. The four bearded figures on the centre of the West side of the South Towers he considered represented Artists engaged on the added sculpture (not the

original work. Immediately over the central West door was the coronation of the Virgin, a group later in date than the others and perhaps done at the time of the erection of the present Lady Chapel ; and above the figures on the top was a representation of our Lord seated in judgment. Traces of colour might be seen on the same, as well as on the figures of the Arch-angels in the second row below. The figures of the Apostles, grouped in threes between, had no colour. Those figures which have foliage sculptured on the pedestals they stand on, and confined to the centre of design, are the oldest. Arabic figures occur on the groups of the Resurrection tier, on all to the left of the centre ; Roman numerals on those to the right. The general idea of the central sculptures intended by the original designer (and not the present arrangement) Mr. Irvine thought was to represent our Lord as the Man of Sorrows in the lower portion, and finally above as triumphant and glorified.

After this preliminary description the Members proceeded to inspect the interior of the Cathedral under the guidance of Canon Meade, who, with the reverent fondness of a man who appreciated his Cathedral, pointed out its beauties and Architectural peculiarities, with all of which he was thoroughly conversant. A pause having been made at the West end to admire the general effect of the interior, the eye ran away from pier to pointed arch, from arch to Triforium and roof, and finally rested with grateful repose upon the harmoniously blended colours of the East window. But little time, however, was permitted to indulge in sentiment which such a general view might arouse ; the Canon, with an activity which might be envied by a much younger man than himself, proceeded at once to details. Here at the West end were two piers of Dulcote stone, the Dolomitic Conglomerate of the neighbourhood, which had been polished by his instructions, and would vie with any so called 'marble' in appearance. Passing up the centre aisle he paused opposite the Shrines of Bishop Bubwith (1407-1424) and of Hugh Sugar, LL.D., Treasurer of Wells, and one of Bishop Beckington's exectuors, pointing out the three sugar loaves on the shields on the cornice of the South Shrine ; thence to the Shrine of Bishop Beckington (1443-1465) in the West end of the South Choir aisle. Nay, not to the Shrine, but merely

to the canopy of the Shrine of that famous Bishop, for this canopy has been moved away from its original position, and placed with exquisitely bad taste which has come under the lash of Mr. Freeman's criticism in its present place. The ancient fifteenth century ironwork still surrounds the canopy. Thence to the tomb of William de Marchia, Bishop from 1293 to 1302. The headless figure of the Angel at the West end under the canopy was pointed out as an almost inimitable piece of sculpture, the attitude and repose of the drapery being very life-like. Thence past the tomb of Bishop John Harewell, and on to the Lady Chapel with its clustered pillars and many-coloured glass of the fourteenth century: in one of the windows on the South side occur the words—'*Ista capella constructa est*'—and then unfortunately the name is obliterated. In the West compartment of one of the North windows are two shields—one 'gules, ten bezants,' the other and the lower one, 'Barry of six, with an obscure figure.' Along the North aisle of the Choir, and into the Crypt or 'undercroft' (which is on a level with the floor, and not below the church as generally), the Canon guided the Members. The stone lantern, the old oak door bound with richly-wrought ironwork, the plain and simple groining, were all pointed out, and then up the ingeniously-contrived staircase to the Chapter House, one of the best examples of the thirteenth century, octagonal in plan, with its clustered central pillar and elegant fan tracery. Here Mr. Irvine again described the constructive details and gave a short account of the various stages through which it had passed. The original Norman Chapter House he considered may have been situated on the South side of the Cathedral. The present one, said to be built in Bishop March's time, though planned before 1286, had not then been begun, though the Crypt, or lowermost portion, and the staircase already existed. The geometrical tracery of the windows could not fail to attract attention, and even the ancient floor itself contained an interesting page of

history, for numerous flowing lines incised thereon—to the un-instructed eye mere accidental scratches—were to those familiar with such things the Mediæval drawings of the Architect or mason who designed the windows. To Mr. J. O. Scott is due the credit of being the first to discover this the largest amount of Mediæval detail drawings that exists. Collecting again together beneath the central Tower—in view of the inverted arches, the work of the fourteenth century, thrown across the North and South Transepts and West arch of Tower, for the purpose of strengthening the central piers of the Tower—the Members listened to Mr. Irvine as he went into the history of the early beginnings and later additions of the structure.

Ina, he said, was probably the original founder of a Church here in 704 with a body of priests attached. Edward the Elder founder the See of Wells (905 to 910), but little is known of the Saxon Cathedral which existed about this time. In the stone Church erected possibly about 790, Brihtelm, one of the Bishops of this period, was buried. Bishop Gisa, who succeeded Duduc (1060 to 1088), built a Cloister and Refectory. To him succeeded John de Villula, 1088, a Frenchman from Tours, who was appointed to Wells by William Rufus, and was the first Bishop after the Norman conquest. He paid but little attention to Wells, however, as one of the first things he did was to remove the See to Bath (1091 or 1092). Godfrey, who succeeded him in 1123, did not do much for Wells. To his successor, however, Bishop Robert (1136 to 1165-6) was due the repairs of the Saxon Cathedral probably, together with the rebuilding of the Presbytery in Norman times. The next Bishop, Reginald Fitz-Jocelin, who had been Abbot of St. Excuperantius, at Corbeil, as early as 1174, and was therefore well up in pointed work, and was Bishop between 1174 and 1191, commenced rebuilding; and to him may be attributed the architectural part (but not the figures) of the West front. Savaric who succeeded him was Bishop of Bath and Glastonbury, and may be passed over. And now we come to Jocelin of Wells (1206 to 1242), who, though connected with Chichester, was truly a Wells man, and may be said to have been the builder of the wing of the Cathedral as it now stands, i.e., the Transepts and what are now the three Western arches of the Choir. He seems to have begun from the Presbytery and pulled down all, including the West front of the old Saxon Church, which stood much short of the inside of the present front. He probably

rebuilt the Cloisters which had been pulled down, for we have record of a burial having taken place here about this time (1243). Bishop Button II. (1267-1274) seems to have been the next Bishop of any particular note so far as the fabric is concerned. To funds and donations at his tomb may be attributed the comic figures on the capitals of the piers of the South Transept; for being looked on as the holiest man of his time miracles were supposed to be worked at his tomb after death, and the offerings thereon were no doubt a fruitful source whence funds were procured for building purposes. Toothache seems to have been one of the ills which he is supposed to have cured, hence the heads representing every imaginable form of that malady.

And thus showing great familiarity with the architectural details, and with several references to Professor Willis and Dr. Freeman's lectures, Mr. Irvine lucidly traced the history of the edifice; but time was on the wing, and it was found necessary to move onward. Through the Cloister door, into the Palace grounds, and around the wet ramparts, the work of Ralph of Shrewsbury, Mr. Scarth conducted the Members. The once appropriate Latin line inscribed by Bishop Law over the summer house seemed a mockery in the then dripping rain:—

*Ille terrarum mihi præter omnes
Angulus ridet; ubi non Hymetto
Mella decedunt, viridique certat
Bacca venafro.*

*Ver ubi longum, tepidasque præbet
Jupiter brumas, et amicus Aulon
Fertili Baccho minimum Falernis
Invidet uvis.*

After much needed refreshment at the Swan, and the passing of a cordial vote of thanks to Mr. Irvine for his admirable notes on the Cathedral, an adjournment was made to the Parish Church of St. Cuthbert, where the Vicar, the Rev. J. Beresford, kindly met the Members. The present Church dated from the thirteenth century, and was probably built by Bishop Jocelin in 1240, though traces of an earlier Norman Church existed. Many altera-

tions had been, however, made ranging from the fourteenth to the sixteenth century ; and Mr. Irvine pointed out where the North pillars of the nave had been raised in Perpendicular times, and where the old stone work had been used over again ; the original height of the nave was shown where the gable line still exists on the West face of the East wall of the Tower ; and the ancient masonic marks were very numerous in the old stone work. The famous Jesse altar, the work of the latter part of the fifteenth century, with its once beautiful sculptures defaced ; the curious bosses in the South porch ; the seventeenth century pulpit with its grotesque carvings of Jacob wrestling with the Angel, Sampson and the lion, David and Goliath, Jonah vomited forth from the whale's mouth, Daniel in the lion's den with its heathenish and semi-classical surroundings, having been duly noted, together with an old Prayer Book dated 1751 (containing prayer for the Dowager of Wales, the Duke and the Princesses), with the following writing on the inside cover :—

The gift of Mrs. Lloyd to Susannah Lovell, 1801.

The last place visited was the Vicar's Close, unique in its way, with its hall at one end, chapel at the other, and its range of houses with elegant chimneys on either side ; originally the work of Ralph of Shrewsbury, 1329-1363, but recast and almost rebuilt by Bishop Beckington's three executors, Richard Swan, Hugh Sugar and John Pope, so that Bishop Beckington may be called its second founder, 1443-1465.

The rain being too persevering to admit of much enjoyment of the surrounding scenery ; the walk to Wookey Hole Hyæna Den was deferred to a more fitting time, and the members now began to beat a hasty retreat to the Swan, and returned to Bath, some by rail and some by road.

Sept. 30.—The last excursion was to Edington and the Cherhill White Horse. Captain Sainsbury, one of the directors, having obtained permission for the Members to view the Westbury iron works, took command of the party consisting of some twenty-

eight members, and introduced them to the manager, Mr. Anderson, under whose guidance the various processes of tipping, mixing, and smelting the ore were inspected; then, passing the large heaps of chalk brought from the neighbouring downs for the purpose of being used as a flux (nineteen hundredweight of chalk to three tons of ore), and peeping in through the openings in the blast furnaces at the rainbow tints of the incandescent gases, and admiring the fertility of mechanical skill which has utilised so mighty an agent for industrial purposes, by some extraordinary attraction the party found itself in the manager's room admiring a rich collection of Roman coins in silver and copper, Roman pottery and pottery moulds, and a curious iron implement which at the time much puzzled the antiquaries as to its date and use. A native, however, in the course of the morning's walk, near Bratton Church, threw a flood of light on the subject, as he was seen bearing on his shoulders a polished specimen of the same instrument wherewith he had been digging potatoes. It may be described as a spade with the solid centre cut out, somewhat similar to a garden hoe, leaving only sufficient material at the bottom to raise the potatoes by. This form seems peculiar to this district. Various large Saurian vertebræ and other remains from the Kimmeridge clay were collected in this little museum, which boasted likewise of some good champagne and sherry provided by the kind forethought of the directors, who, with Mr. Anderson, were duly thanked for their hospitality. With some little difficulty a start was again affected, and the next points of interest were the section whence the ore was being dug out; the 'pockets' or depressions about two or three feet below the surface, where the principal Roman remains occurred; and a curious section of Kimmeridge clay, with reddish brown iron sands below intercalated with greenish blue bands; and then the Members breasted the hill in good earnest for the White Horse and Bratton Castle. Mr. Skrine was already at his post, just above the tip of the White

Horse's ear, about 680 feet above sea level, and armed with a goodly basket of sandwiches and a map of the country, discoursed pleasantly on the battle of Ethandun, which he considers to have been fought in these parts (*vide* p. 34). Mr. Skrine having been thanked for his paper, the Secretary then called the attention of the Members seated on the edge of the Chalk escarpment, with an extensive range of rich woodland spread out before them, to the strata over which they had passed since leaving Bath; how they had crossed in ascending order from the older to the more recent beds, and that they were now standing on one of the most marked features in our English landscapes, a portion of the great Chalk escarpment. The origin of escarpments was then discussed, and the importance of the Chalk districts as a great water-bearing formation, the length of time taken for the rain falling on the surface to pass downwards to the deep-seated springs, so that the heavy rainfall in the winter is not felt in these springs until the summer (*vide Prestwich's Address, Quart. Jour. Geol. Soc. Vol. XXVIII*), and some other points of geological interest. Time, however, did not admit of a longer delay at this point, and the Members pressed rapidly onwards across Bratton Camp down into the hollow where nestles the little church of Bratton, which a native of the place (evidently 'the oldest inhabitant of the village') called the 'Mother Church of England,' and as he further informed us, 'was built so strong that they could not beat her down in the civil wars:' so far for the strength and antiquity of the church! Whilst waiting here for the key, Mr. Skrine gave a short account of the history of Edington Priory, and then the Members passed on, some to their dinner at the Duke of Wellington, at Bratton, others to visit the fine old church at Edington. Finding the doors open they were fortunate in meeting with the venerable Vicar of the parish, who, notwithstanding the fact that he had just been showing a party of ladies round the church, most courteously pointed out the chief objects of interest to the Members.

As the train was to be met at Westbury, a return to Bratton was necessary. And after a short delay for the needful refreshment at the 'Duke,' the Members walked back at the foot of the escarpment along which they had walked in the morning.

At the request of the Vice-President a *by-excursion* was arranged for the purpose of following the Roman road along the crest of the hills from Uphill to Banwell; and, with that object in view, on 29th May Mr. Scarth met the Members at the Uphill Station and conducted them over Bleadon Hill along the ridge of the Mendips. After mounting the hill from the Station, two or three earthworks were crossed running right over the crest of the ridge from north to south, and apparently thrown up for the purpose of defence; owing, however, to the progress of cultivation many traces of ancient occupation have evidently been obliterated. On the way some irregularities on the surface indicated the spots whence ore had been excavated. Notwithstanding the fine views reaching away on either hand, some of the Members felt much distressed at the frequent necessity of surmounting various obstacles to their easy progress in the shape of walls and hedges, and expressed much anxiety as to the distance to be traversed before reaching Banwell. This was at length accomplished, and a satisfactory termination ensued to the day's excursion.

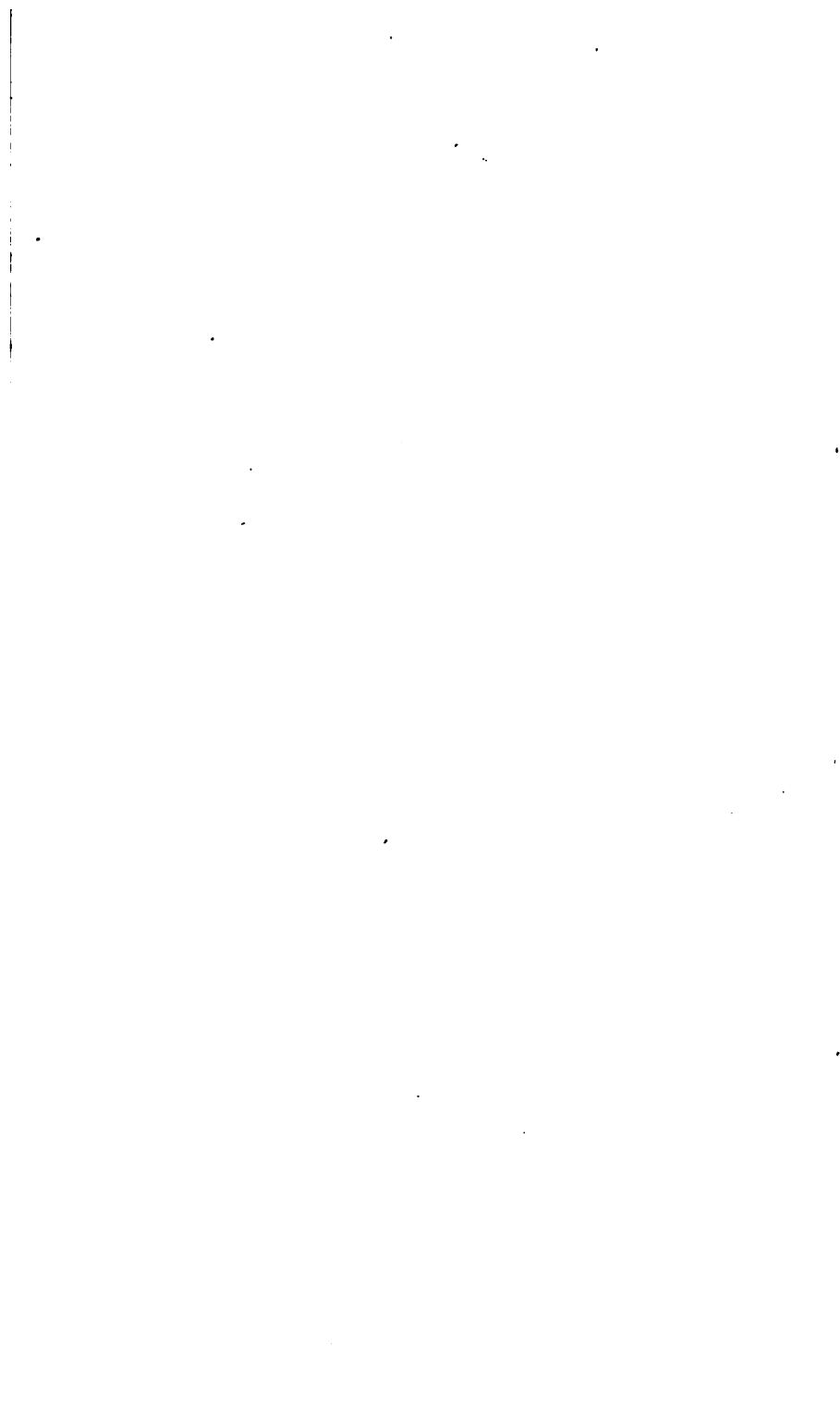
One other *by-excursion* deserves especial record. On Tuesday the 21st twelve of the Members accepted an invitation from Mr. McMurtrie, of Radstock, to visit some interesting geological sections in his neighbourhood. The day was most unfavourable for the hammer, as, with the exception of five minutes, the rain was incessant the whole of the day. Instead, therefore, of driving, as had been proposed to Old Down, and walking back through the railway sections to Radstock, an alteration in the day's programme was necessitated, and a visit paid to some very fine earthworks called the 'Bulwarks,' which are apparently little known; though Collinson writes of them as Roman, this seems

rather doubtful, as the reason he gives is not by any means convincing. A rampart of semi-lunar form cuts off a neck of land with a deep valley on either hand. The scenery, so far as the rain admitted of its being seen, was very picturesque, but a mere hasty walk along the vallum was all that could be accomplished, and a more careful inspection was left for finer weather. A curious fissure in the rocks adjoining, called the 'Fairy Slatts,' was the next point visited. These 'Fairy Slatts,' occurring in the Dolomitic Conglomerate, were most probably the remains of some mineral 'drivings' of the ancient people. Mr. Niblett, of Gloucestershire, here informed the members that the term 'Slatts' was a provincial name for slates, and that 'Slatter' was an old patronymic derived from the manufacture of that article. He further added that 'Scowles,' (derived from the Welsh word 'Ceunawl,') a cave, was a term given to passages into or through the hill-sides in the Forest of Dean, said to have been the delvings of the ancient inhabitants, Romans or Celts, in search of iron. Passing onwards to Broadway lane the last stoppage occurred at the point where the Somerset and Dorset line crosses the road. A very remarkable section of Lower Lias and Rhœtic beds lying in a trough against the Dolomitic Conglomerate is exposed here. The more enthusiastic of the party descended amidst mire and clay to have a look at it; the rest remained in the 'break,' content with their day's wetting and somewhat damped in their ardour. A most hospitable lunch, provided by Mr. and Mrs. McMurtrie, however, restored their spirits, and sent them home refreshed and gratified. Before leaving an opportunity was given for the examination of Mr. McMurtrie's fine collection of coal ferns and other fossils, together with his admirable sections. Amongst the fossils especially worthy of notice was a *Limulus* found in the Camerton pit.

The usual Tuesday walks have been well sustained, though any novelty in them can hardly now be expected. The sinking a new shaft at the Twerton Colliery, which has reached a depth of some

60 feet in the Lower Lias clays, has formed an interesting object for two or three walks in that direction.

It now only remains to state that additions to the number of Members still continue, so that the limit of one hundred will speedily be reached at the present rate of increase ; and to remind the Members that an Album has been provided for the purpose of receiving photographs of objects of Archæological, Antiquarian and Scientific interest from the immediate neighbourhood ; and your Secretary hopes it will receive many additions.



On some Excommunications and Public Penances in Somerset. (Temp Archbishop Laud.) By E. GREEN.

(Read December 17th, 1874.)

After passing by a somewhat easy promotion through nearly every subordinate office, William Laud, D.D., became Archbishop of Canterbury in the year 1633. From his conduct towards the Church, and also his great favour with the King and Queen, the former doubtfully Protestant, the latter an active Papist, he was considered as being not unfavourable to the re-establishment of Popery as the National Religion; and as President of the High Commission Court, a Court then existing for the punishment of ecclesiastical offences, he soon obtained an excessive authority and power, which he at all times used without the slightest feeling of mercy, against any who differed from him or who opposed his novel proceedings.

By his "sole order and without any warrant of Law" innovations were introduced into the discipline of the Church, and in particular he endeavoured to revive the ancient judicial independence of the Bishops which had been specially abolished at the time of the Reformation; or, using the words of the Charge against him, "to set them up above the Law as supreme judges of all matters in their respective Sees, so usurping a Papal and tyrannical power to the derogation of the King's supremacy."* For this purpose the decision of local, and often trivial, questions or offences were referred to them and through them to the Archbishop, by whom the offenders were reduced to obedience, either by heavy fine, or corporal punishment, or by ecclesiastical censure; or by penance and deprivation if they happened to be known as "learned pious and orthodox" Divines.

The following examples, taken from the original documents and MSS., are selected partly for their local interest, and, in part, as

* Articles against Laud.

showing how these proceedings were met and resented in our county.

The interference of the Bishops in cases of adultery and its allied misdemeanours caused especial and great annoyance. Somewhat in point is the case of David Biffin, of Cannington, labourer; who, on the 6th Nov., 1637, sets forth that, about a year and a half previously, one Richard Grave, *alias* Hooke, of Enmore, blacksmith, and a man of "good abilitie," had moved him, the said David, to be a suitor in marriage to Jane Cole, his wife's sister who lived in his house; and that he was there accordingly "enterteyned" and presently "married to her by his procurement, but never had the use of her body before marriage." All hopes of domestic happiness must soon have disappeared, for about six months after the marriage a daughter was born living and the mother being at her delivery in great danger of her life "confessed that Richard Grave was the father thereof." This becoming known, the churchwardens made a presentment of the case to the Archdeacon of Taunton, in whose Court the woman and Richard Grave were enjoined a penance "as a purgation." The former at once performed hers in several churches, but Grave failed to obey, and consequently was "enjoined" a second and again a third time, and still failing, was then excommunicated for his continued contempt. But this man of "good abilitie," not to be subdued without a fight, at once appealed to the Arches Court, made Biffin and his wife parties to the suit, and as they were unable to go to London, he got them both excommunicated for non-appearance, "to their utter undoing, beinge very poore and not able to paye the charges, or to stand in suite of Law." Biffin, therefore, petitioned direct to the Archbishop and begged he would vouchsafe his "commisseration to the distressed estate" of himself and his wife; and give order for their absolution and the discharge of the suit, for which he "would ever pray for his Grace's long life here and eternal blessedness hereafter." The result is not recorded, but probably it was soon settled as the

Archbishop had a means ever ready to stop such "men of abilitie." The petition is subscribed in his own hand—I desire Sir John Lambe* to peruse this petition and give me an account of it, for if my Court of Arches be made a subterfuge for such persons I shall take another course with them by the High Commission.

Nov. 6, 1637.

W. CANT.

There were formerly two degrees of excommunication, the greater and the lesser. By the first those under sentence were deprived of all the church services and the fellowship of their neighbours. They could sit at table with none but their own family, could not perform any legal act, were to be avoided in all daily life, and if they died unabsolved were treated as heathens and denied the usual burial. Any persons corresponding with one excommunicate were liable to the lesser sentence which barred them from the church services only. Besides, if within forty days the offenders did not submit, the Bishop could certify their contempt to the Court of Chancery; when there was issued to the Sheriff a writ, *de excommunicato capiendo*, by which they were sent to the county gaol until such time they were reconciled, or for not longer than six calendar months. But if any were excommunicated for a cause which they considered unjust there was a right of appeal to the Court of Arches. Unlike penance, a money payment could not be substituted for excommunication.

Another case and a more interesting one is that of Roger Fort, Robert Fort, Edward Hebditch, Richard Hebditch, Francis Boyce and John Budgett, all of South Petherton.†

It appears that Roger Fort, being churchwarden of South Petherton, gave orders that a coffin of lead, lying in a vault in the church there, "covered with a blew stone and neare a faire monument of an Earl of Bridgewater and his Countess," should

* Dean of the Arches Court.

† State Papers. Domestic 1637. Vol. cccclxxxiii. Art. 31.

be dug up, that the lead might be melted and put to other uses ; he persuading William Reynier, his brother churchwarden, that by so doing they would save the parish charges. Acting upon this order, Robert Fort, the Beadman of the parish, "in an afternoone, towards night, the church doares being locked, and hee quiet in the church, and again on the next morninge, because he could not end that night, about fower or five of the clocke, the church doares then likewise kept faste, he digged the said grave or vault ; and Richard Hebditch, parrishe Clark, and Edward Hebditch, his sonne, beinge p'sent and consentinge thereunto, the said Richard Hebditch went down into the grave or vault with a candle, searching not onelie there but alsoe in the said coffin, after itt was ripped upp, for jewells or some other thinge of value, and seeing as itt seemed haire in the said coffin of a yellow colour, he went to take some of itt in his hand and itt fell to dust." Robert Fort, Edward Hebditch, Francis Boyce and John Budgett then lifted and drew the coffin out of the vault, and Robert Fort laid the bones that were in it into the grave again and filled it up and made the surface plain. Boyce and Budgett, being plumbers, then took the lead and melted it. Through ill-feeling on the part of one James Beale, as wishing to "malign" Robert Fort, the affair became known. Information was sent to the Bishop, and after investigation it was found to be true, partly from Beale's story and also by the frank acknowledgment of those engaged in it.

The Bishop took a serious view of the case, and considering it a very barbarous and sacriligious violation of the grave of a noble personage on the 24th of February, 1637, "certified my Lords Grace" of all the particulars, with a copy of the depositions under his Registrar's hand. He reported that the country "ranged" of it, all who heard of it detested it, and people feared that if the accused escaped without heavy censure, they in turn would not be allowed to rest in their graves. The Archbishop at first had a mind to have the parties

called before him in the High Commission Court, but on learning that "they were very poor men and worth nothing, save Fort," and considering the great distance of the place from London, he chose rather to leave the settlement with the Bishop, giving directions that if the charge were proved the offenders should all be severely punished, as an example to deter others from any similar conduct. The Bishop then, in the presence and by and with the advice of his Chancellor, the Right Worshipful Arthur Duck, Doctor of Law, on the 28th of March, 1637, "enjoined" Roger Fort and the others to do penance in the cathedral at Wells, and in the parish churches of South Petherton and Taunton, having white "wannes" in their hands, and on their heads papers bearing text letters declaring the nature of their offence. Robert Fort, Richard Hebditch and Edward Hebditch, performed their penance at once in every particular, as did afterwards, but reluctantly, Francis Boyce and John Budgett; but Roger Fort, considering the sentence "too sharp and excessive," stoutly refused to do it, and was therefore excommunicated for his contumacy.

It is curious to observe here how the mere labourers, being "very poore men," obey without visible protest; how the plumbers, Boyce and Budgett, are half inclined, but hardly dare, to risk the cost of disobedience; and how Roger Fort, because of his somewhat better social position, boldly rebels and goes to the fight to assert his independence.

The Bishop being at Croydon in September, 1637, used the opportunity to have "some speech" with the Archbishop about this case, and asked him if, supposing Fort would give "a good commutation" for his penance to St. Paul's, which he had heard privately he was inclined to do, whether he should accept it, and the Archbishop said he "liked that course very well."*

At various times Fort went to the Bishop, at one time saying

* S.P., Bishop Pierce to Sir Jno. Lambe, Vol. cccxxxiii.

he would do his penance, at another that he would commute; and early in November he seemed inclined to settle by giving a hundred marks to St. Paul's,* but a fortnight later he suddenly went to London, and on the 19th November, 1637, appealed to the Arches Court and there delivered in his own account of the whole business. In this he states that the sexton of his parish had, whilst making a grave in the aisle of the church, "digged up" a certain sheet of lead, but entirely without inscription, or any ground stone over or near it, and wherein a corpse, then all consumed to dust, had been, by conjecture, buried some two or three hundred years before. The leads of the church being in great need of repair, he, being a "plaine and inexperienced" man, with the consent of his brother churchwarden, the minister and all the chief parishioners, caused the lead to be employed in such necessary repairs, "not converting any part to his own or any other use." He therefore prayed that his cause might either be heard or referred to others, and relief granted if his "innocent simplicitie" should be justly proved.† The document is underwritten,—“I desire Sir John Lambe to peruse this petition and to give me an account of ye particulars here suggested.”

Nov. 19, 1637.

W. CANT.

This Sir John did accordingly, and eventually the matter was sent back to the Bishop for further consideration. As Fort had offered to substitute a payment of ten pounds, Sir John seems to have considered him as hardly used, and gave him a letter, dated 20th Dec., to carry down to Wells, in which he suggests that he should be absolved by Christmas. On his return Fort went to James Huishe, the Registrar, and offered

* The King had granted to Laud all such fines towards the completion of the then St. Paul's, and this gave rise to the saying that St. Paul's was built with the sins of the people.

† S.P., Vol. cccxxii., 4.

twenty pounds to St. Paul's, stating that if that were not accepted he "would take out his orders," and do his penance. He appeared again on the 11th of January, 1638, which must have been close upon the last-named interview, this time before the Bishop and the Registrar, and delivered Sir John Lambe's letter, perhaps fearing to do so earlier; and clearly not knowing its contents was induced to give up the benefit of his appeal, saying "I do renounce all appeals in this business by me formerly made, and I will never appeal more, I will rather do my penance." Sir John Lambe, getting no answer in due course to his letter of the 20th Dec., 1637, wrote again on the 12th February, 1638, stating that Fort had offered ten pounds to St. Paul's for a commutation and would add ten pounds more, which he thought to be enough, as he had been already kept so many months excommunicated and had sought absolution with so much "travail and cost," a hard case he considered "for any Christian." In concluding he requested the Bishop to make an end of the matter, otherwise he could not deny the petitioner an "Inhibition to make trial of the truth of his cause." Nothing coming as usual of Fort's promise, the Bishop now sent his Registrar to him, when he again expressed his intention to give up his appeal, and under the continued pressure, being ignorant of the Dean's inclination towards him, he offered thirty pounds to St. Paul's, and promised to go to the Bishop in a fortnight to know his decision, asserting as before that if that money were not accepted he would do his penance. Although thus gradually squeezed he chose to forget this promise also, and the Bishop, in answer to the Dean's letter, wrote that as his Chancellor was present when the penance was enjoined, he could not consider it too sharp or excessive, and as Fort had never offered to submit, "indeed he will do nothing and is an idle fickle minded fellow," he hoped the Dean would not have him absolved without submission or satisfaction. He concludes by "beseeching" the Dean to present his humble duty to "my Lord's Grace," whose commands he had fulfilled in this affair, and to

acquaint his Grace with what he had written, "only he would like to know, if Fort offers thirty pounds to St. Paul's, whether it should be accepted," and as to the Inhibition, if, writes the bishop, "you think fit to grant it after he has renounced his appeal, I cannot help it, only I will justify what I have done to be just and right." From the favour of the Dean of the Arches and the hesitation of the Bishop, it almost seemed that this "idle fickle minded fellow" would be allowed to gain his cause, and he may be said to have partially done so, for after having offered thirty pounds he eventually cleared himself by a payment of twenty only, and this sum the bishop was afterwards charged with extorting from him "against the law and for his own private lucre."*

Besides innovations in the discipline, Archbishop Laud also introduced "many Popish and superstitious ceremonies" into the services of the Church,† and the act of this now troubled time, which caused the greatest consternation, and which was afterwards brought forward prominently against him, was the alteration he made in the position of the Communion table.

From the beginning of the Reformation, "even to his coming to be Archbishop," it had stood within the chancel, table-wise, some distance from the wall, without any rail about it, and with the ends east and west. It was now by his orders to be placed altar-wise against the east wall, with the ends north and south, and "hedged in" with a costly rail. Upon this "altar," as it was then to be called, was placed much "Romish furniture never used in his predecessors' days, viz., two great silver candlesticks with tapers in them, besides basons, and other silver vessels;" and in his own chapel at Lambeth was a picture of Christ receiving His Last Supper with His Disciples, in a piece of arras hanging just behind the midst of the Altar, and a Crucifix in the window

* Articles against Bishop Pierce.

† Articles against Laud.

directly over it, all which was shown to be copied from the Romish Ceremonial,* This alteration was first designedly made in the Archbishop's own chapel and afterwards in the Cathedrals there to be pointed to as what the parish churches were expected to do. In 1633 Dr. William Pierce, Bishop of Bath and Wells, in his Visitation Articles, not only ordered this offensive change, but being "a great creature of the Archbishop's" at once appointed Commissioners in every division of his Diocese to see it executed, or to certify to him any defaulters. Whilst the obedient clergy, comparatively few in number, were to present disobedient churchwardens, the latter in turn were forced on oath to present the clergy and all others who would not submit.

The order was forcibly opposed throughout the county, and especially by the parish of Beckington. As in other churches the Communion Table at Beckington had for seventy years and more stood in the midst of the chancel, enclosed with a very decent wainscot border and a door, with seats round about it for the communicants to receive in. The churchwardens, backed up by their neighbours and the Lord of the Manor, Mr. John Ashe, of Freshford, who all agreed to bear their share of any charges which might be incurred, refused to obey the Bishop's injunctions, and would have their chancel arranged and the Table there placed "as they thought fit."* The Bishop's Commissioners on viewing the church certified that there was not a decent Communion Table, neither was it placed under the east window, nor railed in otherwise than with a border about it where the communicants knelt, and that there were seats above the Table. The Bishop on this certificate commanded James Wheeler and John Fry, the churchwardens, to execute his orders, and to return an answer under their hands before Ascension Day, 1634, and afterwards, by "word of mouth" he "enjoined" them to do it. But they, conceiving it to be against the Rubric, Queen Elizabeth's injunctions,

* Canterbury's Doom.

and the 82nd Canon, stoutly refused. They were consequently on the 9th of June, 1635, cited into the Bishop's Court at Wells, before William Hunt, the Bishop's Surrogate, and Dr. Duck, his Chancellor, "for that the Communion Table in the chancel at Beckington was not placed under the east window of the chancel, nor railed in otherwise than with a border about it, and that there were seats above the Table." They were here again admonished to repair these defects, to place the Table north and south as in the Cathedral, and to certify that they had so done by the 6th of October following. Continuing disobedient, they were next excommunicated in open Court by the Bishop himself.* Safely supported by their fellow parishioners as to the expenses, which eventually amounted to £1,800, they now went to London, appealed to the Arches Court for relief, and gave in the following fourteen Reasons for their refusal to remove the Table from where it had stood since the Reformation :—

- 1.—We have noe Injunction from his Royall Maiestie.
- 2.—Noe statute confirmed by Act of Parliament.
- 3.—Noe Canon at all for ye altering of ye Table.
- 4.—Noe articles to which we are sworne.
- 5.—Wee expect noe change of Religion, (blessed be God).
- 6.—We are to continue ye year of ye Church.
- 7.—As we should hereafter be questioned in Parliament we know not how to answer it.
- 8.—Nor dare we call in question ye manner or forme of Religion soe longe hapily established.
- 9.—We have nothing to doe to place things in ye chancell.
- 10.—We be sworne to have God before our eyes, and not man, and to looke to ye suppression of vice and maintenance of vertue, and we know noe vice in ye antient standing of ye table, nor vertue in ye innovatinge it to a high altar.
- 11.—It is prohibited in ye table of degrees, in ye last date of it.

* Articles against Bishop Pierce.

- 12.—All ye orthodox Bishops, governours of ye church upon reformation in King Edward's time of blessed memorye, have either written or preached against altering ye table.
- 13.—Divers of ye Bishops and the eminent Divines in Queen Marie's time have sealed the same with their blood.
- 14.—All ye modern Bishops, governours of ye church since ye established reformation in Queen Elizabeth's Raigne, Kinge James, and King Charles, for almost 80 years have not altered ye antient standing of ye Communion Table, nor hath beene attempted until this 2 or 3 years.*

These "Reasons" are endorsed—"This I thinke is ye answer which is soe much taulked of to Dr. Heylin, and all ye answer for other I can neither see nor beleieve yet what do they not bragg of."

This opposition and the reasons given necessarily attracted much attention, and brought the Beckington people into prominent notice in the Diocese, where every parish anxiously watched the result of their appeal. After much waiting in the Arches Court, the petitioners got from Sir John Lambe, the Dean, a letter to their Bishop requesting him to absolve them for a time. This he accordingly did for twenty-seven days, admonishing them then to submit. But in reply to the Dean's letter, and clearly not liking too much interference from him, the Bishop wrote on the 2nd January, 1636 :—"If these men have their wills the example will do a great deal of harm, and then many of the parishes which have already conformed will fall back, and others will never come on to this conformity who are now at a stand to see what will be done at Beckington. Therefore I feel assured you will do nothing herein but that which shall be for the good of the Church and preservation of authority in all things just and lawful."

The twenty-seven days passed, and as there was still no sign of obedience, Wheeler and Fry were again excommunicated in open Court on the 13th January, 1636 ; and further, at the Lent Assizes

* From *Sommersetshire*, S.P., Vol. cccxxv., 84.

the Bishop caused them to be indicted as for a Riot—probably from some scuffle whilst hindering the alteration. They now appealed a second time to the Arches Court, and also sent to the Archbishop the following petition signed by about a hundred of their fellow parishioners :—We the inhabitants and parishioners of Beckington do humbly certify that the Communion Table of our Church hath and doth stand in the midst of the chancel, being the most convenientest place (time out of mind), and beyond the remembrance of any of our parishioners now living. And that near threescore years since the pavement of the said chancel upon which the Communion Table standeth was new made, and in the new making thereof raised about a foot above the rest of the ground, and then also compassed about with a fair wainscot border in which there is only one wainscot door to come into the said Table, which door is kept fast and none doth enter thereat but the Minister and such as he doth require, which said Communion Table doth at the day of the date hereof stand so conveniently and decently as aforesaid. And we the said parishioners, with a unanimous consent do humbly pray, That it may so continue freed from all innovation, and so do humbly take our leaves.—Dated this 19th Dec., 1635.

Here it may be noticed the usual form “and your petitioners will ever pray for your long life, &c., &c.” is omitted, and a much shorter finish substituted.

The Archbishop, in reply, refused to admit their appeal, threatened them all with the High Commission Court, and to “lay by the heels” their solicitors, Mr. Wm. Long and Mr. George Long, and finally commanded them at once to obey their Diocesan. Determined still to hold out they now appealed directly to the King, pointing out as before that all former Archbishops and Bishops had approved of the table being where it was. To this Laud, by his influence, prevented any reply. Being thus destitute of all relief, the churchwardens continued, as the Bishop called it, “in a most contemptuous manner” excommunicated for about a

whole year, when they were arrested upon a *Capias Excommunicatum* and imprisoned in the county gaol, from which they were released only on their "earnest request and submission," and sentenced to the following penance. Omitting the usual white sheet and the papers for the head, in consideration of their submission whilst in gaol, it was ordered that on Sunday, the 26th day of June, 1637, being in their ordinary apparel, they should stand forth in the middle aisle of the Parish church of Beckington, and there immediately after the reading of the Gospel, "openlie and penitentlie," with an audible voice make this acknowledgment following, repeating the same after the Minister, viz.,—We James Wheller and John Frie doe here before this Congregation assembled acknowledge and confesse that we have grievouslie offended the Divine Maiestie of Almighty God and the laws ecclesiasticall of this Realme of England, in that we have in Contemptuous manner refused to remove the Communion table in the Chancel of the parish Church of Beckington and to place it close under the East wall of the said Chancell in the same manner and forme as the Communion Table standeth in the Cathedrall Church in Wells, and to remove the seates placed above the said table; being hereunto lawfully and Judiciallye monished and warned by the Right reverend father in God, the Lord Byshop of Bathe and Wells. And, in that, for our contempt and disobedience in not performing the said lawfull command of the said reverend father, wee have suffered ourselves to be lawfully excommunicated and so to stand for the space of one whole year last past or thereabouts, not fearing nor regarding the dreadful Censure of the Church. And in like manner have suffered ourselves to be lawfullye aggravated and signified according to the laudable lawes and statutes of this Realme, thereby in a loyall manner to compell us to our due obedience to the lawfull command of the Church, and wee doe hereby protest that we are right heartily sorry for the same. And we doe faithfullie promise never from henceforth to offend in the like again, but to demeane our-

selves as shall become good Christians and dutiful subjects. And we do ask God forgiveness for this our synne and offence, and you all here present for our evill example. And we doe desire you all to pray for us and with us to Almighty God that it may please him of his infinite goodness to forgive us of this our offence.

Then "humble and penitentlie" kneeling down, they were to repeat the Lord's Prayer.

The completion of the penance was to be certified to Wells, under the hands of the churchwardens and minister of Beckington, on Tuesday, the 27th of June, and was so done accordingly by

ALEX. HUISHE, Rect. ib'dem.

The mark × of RICHD. BURT, } Churchwardens.
ALEXANDER WEBB, }

A similar penance was performed on the following Sunday, the 2nd of July, in the parish church of Frome Selwood before the pulpit or minister's seat there, and its performance was duly certified on Tuesday the 4th of July, under the hands of

JOHN BEAUMONT, Curat. ib'dem.

THOMAS ALLEN, } Churchwardens,
JOHN NORFOLK, }
WILLYAM COOK.

It was also done on Sunday, the 9th of July, in the parish church of St. Peter and St. Paul in Bath, and was so duly certified on Tuesday 11th of July by

THEOPH. WEBBE, Rect. ib'dem.

RICHD. DUNCE, } Churchwardens,
THOMAS PARKER, }
HENRY GAYE.

These certificates were examined and passed by

THOMAS ILES, JOHN BAILLYE,
WILLIAM WEBB, GEO. LONG.

So resulted this unusual fight, extending over four years. Never-

theless the parish continued disturbed, and the churchwardens and parishioners opposed and hindered Mr. Huish, the minister, in every possible way from raising a new "Mount" at the east end of the church, which brought upon them further notice from the Bishop.

The shame of this ignominious penance so affected both the actors in it that they never recovered from it and were never the same men again. James Wheeler fell into a consumption, and dying professed on his deathbed that this compulsory submission made so much against his conscience had broken his heart, and was the only cause of his sickness and death.*

During the time these events were passing, and for now nearly eleven years, there had been no Parliament. The King governed by Proclamation, and the Archbishop, through the High Commission and Star Chamber Courts, did pretty much what he would without control. A Parliament being at last necessary, one was called in November, 1640, and these matters now noticed were severely passed in review. The House of Commons proved to be equally obstinate, but so much stronger than the people of Beckington, that, on the 1st of March, 1641, it sent the Archbishop, amidst the jeers of the populace, a prisoner to the Tower, there to await his trial, condemnation and death, as a traitor to the Religion of his country.

Mr. John Ashe, of Freshford, a wealthy clothier, a member of the Parliament, and, as already noticed, Lord of the Manor of Beckington, got access to the prisoner in the Tower, and questioned him about this "most severe, barbarous, and illegal prosecution" of the Beckington people, when the Archbishop frankly acknowledged that Bishop Pierce had acted entirely under his orders. A few months later the indignant people in London mobbed and very roughly handled several of the bishops as they were leaving the House of Lords. They consequently ceased to attend,

* Articles against Bishop Pierce.

complained to the King, and protested that all Acts passed during their absence should be null and void. This protest brought them into contact with the House of Commons, which being at the moment in no mood to bear with what it chose to consider an arrogant interference with its special duties, sent the thirteen protesting bishops prisoners to the Tower under a charge of high treason against that Honourable Assembly. Amongst them was Dr. William Pierce, Bishop of Bath and Wells. A Committee of the House was next named to receive evidence against him, and, as may be supposed, the earliest witnesses were the people of Beckington. But the Bishop always asserted that he had done nothing in that matter but by direction of the Archbishop, and had acted only as an obedient Diocesan to the orders of his Metropolitan*

This determined conduct of the Parliament produced first an Act, passed reluctantly by the King, which deprived the bishops of their seats in the House of Lords, and so practically disestablished the English Church; and afterwards in the heat and anger of actual war, in hatred of the "Lordly Prelates" who held the office, caused the utter abolition of Episcopacy "Root and Branch."

* Canterbury's Doom.

*Tragical Adventure of the Viscount du Barri at Bath.**(Communicated by ROBERT BIGGS, March 18th, 1874.)*

The following paper was found among those which came into my hands, three or four years since, as Executor to the late Mr. Charles Meyler, formerly proprietor of the *Bath Herald*. It appears to have been sent to him for publication at a time when some allusion to, or account of, the transaction had been recently published. It does not appear from the inquiries I have made that he ever printed it (probably from its occupying too much space in a weekly paper), and as it carries with it an air of *vraisemblance* I thought it might be worth the notice of the Club.

Rambles about Bath.

TO THE EDITOR OF THE BATH HERALD.

SIR,—Observing there have been in the *Bath Journal* different accounts of the duel between Viscount du Barri and Count de Rice, I forward you the only true version of the affair, and, which never having appeared in any of the Bath Annals, I hope you will find sufficiently interesting to insert.

The author was chaplain to the late Duke of Northumberland and an intimate friend of both the duellists, and it will be seen from his version of the affair that he was the only person likely to give a correct detail. In those days the Duke was in the habit of wintering in Bath, and was one of its great supporters. From him "Northumberland Buildings" took its name, and the late proprietor of Marchant's Court changed its name to "Northumberland Place," as a token of his gratitude to him.

I observe in the *Bath Journal* a statement as to a grandfather telling his son about its locality. There is better evidence; I know a gentleman whose father was, in 1778, living at Combe Down, and was present and saw by the directions of his father

two large stones placed precisely on the spot where the antagonists stood ; and which were so placed before the Viscount was buried ; and that he can now point out the two spots. The surgeon who attended for the parties, as narrated by the author, was Mr. Cadby, who then practised in this city. If the duel, as stated in the *Bath Journal*, had taken place on Claverton Down, the inquest would have been held in Claverton parish, and in all probability he would have been buried there.

On reference to the Memoirs of Madame du Barri, written in 1791 by herself, it is certain that she, who was the mistress of Louis XV., and the Viscountess du Barri were different persons. These memoirs do not even show her real maiden name from some hidden cause. It, however, appears that she assumed the name of L'ange, a bishop of that name being her godfather.

Mainwaring's Annals ought not to have been quoted as an authority.

Your obedient servant,

October 12th.

J. JONES.

“ The season for the Duke of Northumberland to go and drink the waters of Bath having arrived, he proposed to me, as usual, to go thither with him. Bath is a most agreeable place ; it is the Spa of England, but more convenient and more magnificent. I was very fond of passing some weeks there in the winter ; particularly with the Duke of Northumberland who saw a great deal of company. I therefore accepted the offer and went. We found there a French family, the Viscount and Viscountess du Barri, whom Mrs. Damer had known at Spa and had prevailed upon to come and try the waters of Bath. I became acquainted with them, and was witness to the catastrophe which happened to them and which I am going to relate.

The Viscount du Barri was the son of the celebrated Count du Barri, called *le Roué*. In the time of the great favour of Madame

du Barri with Louis XV., he married the daughter of the Count de Tournou ; of an illustrious family, and a branch of the house of the famous Cardinal of that name. The Prince de Soubise (their kinsman and a near relation of the lady) took her from a convent to effect this marriage ; and I was witness to the indignation of the French nobility against an alliance so degrading to her. The Viscountess du Barri was of a charming figure, and of dazzling beauty ; she had a noble air and much sweetness, joined to great ease and dignity of manners. Her conduct was irreproachable. . . . The Viscount was called to Court. He was cornet in the light horse ; the king admitted him to his private parties, and bestowed many caresses upon him. He conducted himself with so much prudence and modesty that he did not participate in the hatred which was attached to his name. He was, however, overwhelmed in the disgrace of his family upon the death of the king ; for after the accession of Louis XVI. he appeared no more at Court.

In 1778 he was at Spa with his wife and sister-in-law, Mademoiselle de Tournou ; who was about fifteen years old, handsome, full of grace, and particularly excelled in dancing of which she was passionately fond.

They earnestly pressed the Count de Rice, an Irish gentleman, to come with them. Count de Rice was a nephew of Marshal Lascy ; had lived much abroad where he had mixed in the best companies ; and for eight years had been very intimate with the Viscount du Barri. They were likewise accompanied by Mr. Toole, an Irish gentleman in the French service. Upon their arrival in Bath they took a handsome house. Mrs. Damer came to visit them and introduced them to her friends. They kept open house, had parties and suppers, lived at a great expense, and, it was said, had great resources. In reality, besides a considerable credit which the Viscount had upon a banker in London, he was fortunate at play, particularly at *faro* ; which, though it was prohibited in England, was sometimes played at his house. . . .

I was then at Bath. I was introduced at Madame du Barri's ; and I found her house so agreeable that I scarcely passed a day without going thither. . . . One night, when Madame du Barri had a large company, I observed that she seemed very uneasy ; I asked her the reason of it, and she complained of having a head-ache. The Viscount did not appear. I inquired after him ; it was said he was indisposed and Count de Rice was keeping him company. She went twenty times out of the room under pretence of taking the air, and at last did not return, leaving Mademoiselle de Tournou to do the honours of the house.

The next day, at nine in the morning, I was told that the Viscount du Barri had fought with Count de Rice ; that he had been killed in the *rencontre*, and that the Count was dangerously wounded. The situation of the Viscountess at once presented itself to my mind in all its perplexity. Deprived, in a moment, of her husband and of her friends (for Mr. Toole had been one of the seconds) ; young, a foreigner, without experience, without a knowledge of the language of the country, and surrounded with foreign servants ; everything concurred to increase her distress. I ran to her house to offer her my services, and asked to speak to her *valet-de-chambre*. His mistress as yet knew nothing of the matter ; the two friends had gone out at two o'clock in the morning in spite of her efforts and tears. Under pretence of going down with her into the dining-room, they had hastily got into the street ; she ran after them calling out as loud as she could ; they ran faster still, and the darkness soon concealed them from her sight. Let anyone imagine this charming young woman alone, at two o'clock in the morning wandering about Bath, without a guide and abandoned to despair. Her *valet-de-chambre*, who was looking for her, found her leaning against a wall almost senseless, and brought her back to her house. . . . Persons were sent everywhere without being able to hear anything of the Viscount du Barri or the Count de Rice.

The servants had heard the general report of the duel, but

nothing certain was known ; I therefore did not think it yet time to ask to see the Viscountess. It was said that Count de Rice had been carried to a furnished lodging. I went thither ; he was very glad to see me, and related the subject of their quarrel. The origin of it was not important ; but the manner in which it had been conducted, he said, rendered it so. He had made some representations to the Viscount relative to some offensive imprecations which frequently escaped him ; the latter had taken offence at the remonstrance, and, in the heat of dispute, had given him the lie. The Viscount, who was extremely irritable, could not support the coolness of his friend, and grew more warm ; at last things came to such a height that both parties agreed to fight with sword and pistol till one or the other should fall.

It has been said that this was only a pretext, and that Viscount du Barri had begun to hate Count de Rice, who had himself expressed some uneasiness upon this subject to a lady of Bath. But I have reason to think that this opinion was without foundation. They had sent for Mr. Toole, and a Mr. Rogers an Irish gentleman, to be their seconds upon the occasion, and, taking a surgeon with them, had all set off together out of town. They waited four hours till day-break in a carriage which they had taken at Bath, and during that interval settled the conditions of the duel. The Viscount, who was impatient to fight, left the carriage at day-break, and the ground having been taken, he fired the first shot and wounded Count de Rice in the thigh. The Count then fired, and the ball, penetrating the Viscount's breast, severed the grand artery and he fell, the blood flowing copiously from the wound. Count de Rice advanced towards him with his sword in his hand ; when the Viscount, feeling himself weakened, begged his life. " I give it you," replied his adversary ; but as he said these words he saw him roll upon the ground, vomit blood, and a moment after expire. Count de Rice, no longer able to stand, seated himself upon the ground, and the surgeon dressed his wound. The ball had penetrated the upper part of the thigh

to the bone ; the wound was not unlikely to prove mortal, and he was carried with much difficulty to Bath.

In the meantime the Viscountess had sent everywhere. A report of the death of the Viscount had got abroad, but her servants did not venture to acquaint her with it. As I was leaving Count de Rice's, I met her house-steward who was looking for me. He came to inform me that his mistress was in the greatest uneasiness ; that she was absolutely resolved to go out to inquire for her husband, and that he no longer knew what pretext to make use of to prevent her. I ran immediately to Mrs. Macartney, one of the ladies of Bath in whom she had the most confidence, and begged her to go with me to the Viscountess. She went to her first ; she told her that I had brought intelligence of her husband having fought with Count de Rice and being mortally wounded. I went in a quarter of an hour afterwards and found her in such affliction as may be more easily imagined than described. I concluded by increasing it to the utmost, on informing her by degrees, of the fatal event of the duel ; she gave way to an excess of grief which appeared to me profound and real, notwithstanding the cruel attempts of the most atrocious calumny, which dared to attack her under circumstances so entitled to compassion. It was pretended that Count de Rice had excited the jealousy of the Viscount, and that the Viscountess had been the first cause of their quarrel. She now wrote to him ; but as he was not in a state to answer in writing, I offered to carry the note and to bring back a verbal answer. As she did not acquaint me with the subject of the letter, I mentioned this to the Count when I delivered it, and advised him to give me an answer in general terms, which could only be comprehended by the Viscountess. He requested me to say that he had already given orders for what she desired, and he begged me to send the Viscountess's *valet-de-chambre* to him as he had something to communicate to him. He wrote to her, however, by this *valet-de-chambre*, and everybody was astonished at seeing a correspon-

dence promptly established between two persons who, it was thought, ought to have had so little communication together.

I spent the whole day in consoling the Viscountess. An express was sent off to London to Mrs. Damer, who had left Bath fifteen days before, begging her to come down, as soon as possible, to her friends; and I was employed in making preparations for her departure the moment when Mrs. Damer should arrive. I went from time to time to see the Count to obtain some explanations relative to the Viscount's affairs. I learnt from him that the letter of the Viscountess and his answer were concerning the state of these. The Viscount had provided for everything and had adjusted his accounts. He expected a remittance from his banker of 400 guineas, which he had appropriated to the payment of his debts. He had drawn a draft for 200 guineas which he had put into the hands of his house-steward, and it was said that he had 200 guineas in his pocket book, and 150 in his purse which his second had taken charge of before he quitted him. But Mr. Toole was not to be found. He feared the pursuit of justice, if the coroner's verdict which was about to be brought in, should not be favourable to Count de Rice. He had reason to apprehend that it would not, for it appeared that the seconds had concurred in agreeing that one of them must fall. They had marked out a distance of five-and-twenty yards and had agreed to advance upon each other as they might see fit. Each had a pair of pistols and his sword. It was stipulated besides that the conqueror might without quarter despatch his antagonist even when he was upon the ground. It would be very difficult according to the laws of England to have this construed otherwise than as wilful murder. Twenty-four hours after the departure of the courier Mrs. Damer arrived at Bath. I gave her to understand that Count de Rice desired to see her, but advised her not to countenance a proceeding which might justify the injurious suspicions entertained by the public relative to the Viscountess. She therefore merely sent to tell him that unless he had something to communicate to her

essential to the interests of the Viscountess, she could not see him ; and she required that he should give her his word of honour that he would not request her to come but upon that condition. He answered that he would not commit the Viscountess and that he hoped in a short time to be able to write. Everything being arranged, I urged Mrs. Damer to take the Viscountess from Bath ; assuring them that I would undertake to superintend the funeral of the Viscount and to arrange her affairs. They accordingly set out accompanied by Mademoiselle Tournou and the whole equipage. The next day the coroner's jury sat, and declared in their verdict that the death of the Viscount was a homicide occasioned by a quarrel in the heat of passion. The consequences were no longer to be feared by Count de Rice, nor by the seconds. I saw the former several times, and he acquainted me with everything which it was necessary for the Viscountess to know. I set out for London, and arrived there time enough to inform her of them before her departure for France, whither Mrs. Damer re-conducted her. Some days after this I saw Mr. Toole, who had restored to the Viscountess the pocket book and purse of her husband before she left Bath. He informed me of some particulars relative to the quarrel between the two friends. When they sent for him things had gone so far between them that no possibility remained of reconciling their differences. They did not acquaint him, however, with the cause of their quarrel, but he did not doubt that it took its origin in the jealousy which the Viscount had conceived of his friend, though he was very far from imputing to the Viscountess or having ever given the least occasion for it. Since that time I have had frequent opportunities of conversing with Count de Rice upon the subject of this unfortunate affair. He assured me that the true reason of their quarrel was a discovery which he had that morning made of a design to poison him formed by the Viscount ; upon which I represented to him that he had better be silent relative to that reason, for in the impossibility there was of bringing proof of such

E. END OF TUNNEL
W., DEC. 26TH, 1873.
S. SIDE.

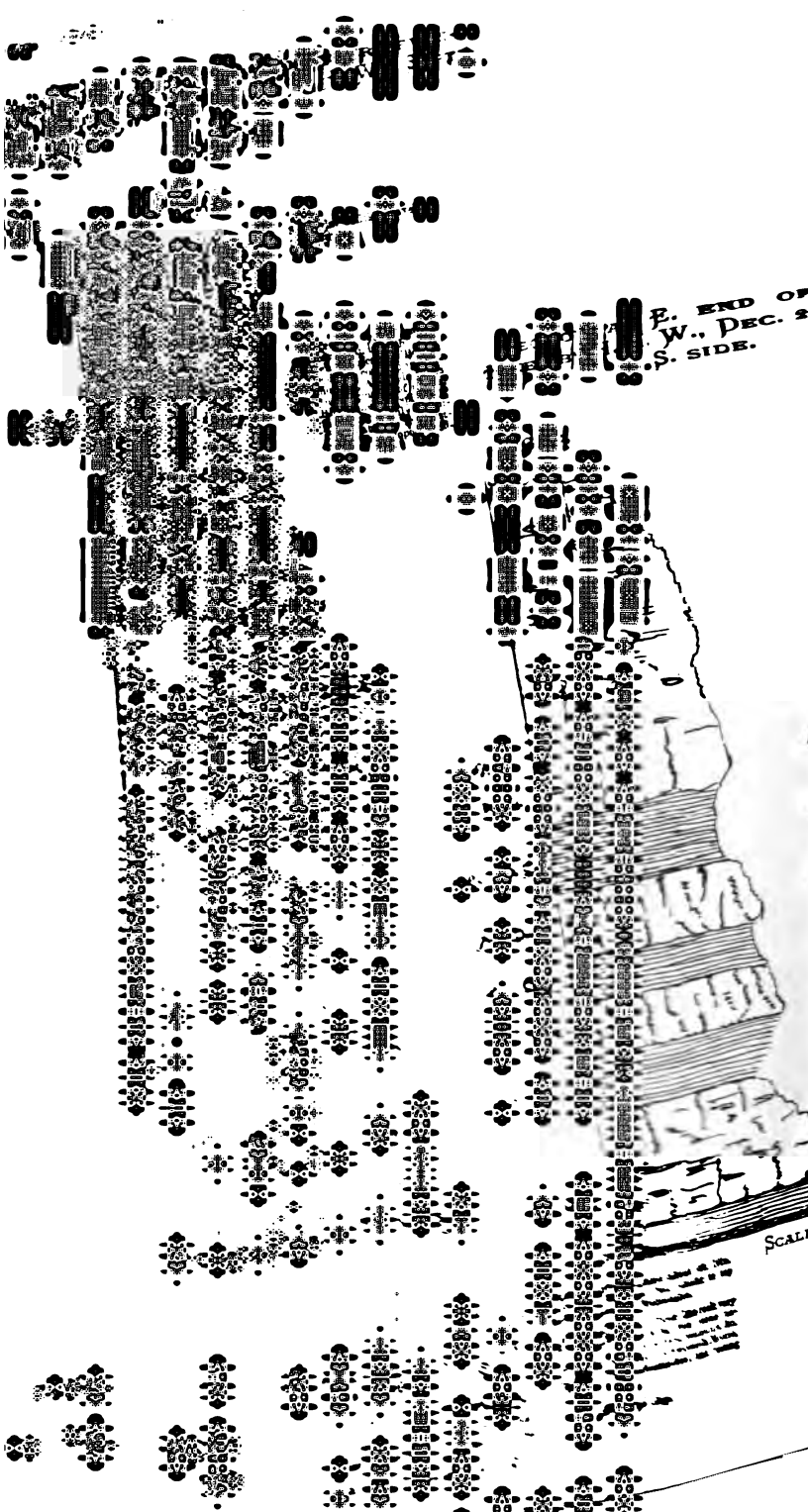
Miscellaneous made notes
on highly ferruginous
colitic grained rock are
taken from some of
dikes, and consists
of: *Strophomena*, *Trematolites*,
Rhynchonella, &c.

- g. Grayish coloured clay
- f. Buff coloured sand
- e. Buff coloured clay
- d. Buff coloured sand
- c. Very coloured Clay.

Concretionary layer
seen but not noted
under & above in some
places. Also in some
places. Also in some
places.

- b. Buff coloured clay with
hard on light blue clay.

SCALE 1 in. = 1 ft.



an attempt he would have reason to fear that the accusation would be considered as a calumny against a man who could no longer defend himself."

Notes on some Railway Sections near Bath. By Rev. H. H. WINWOOD, M.A., F.G.S.

(Read March 18th, 1874.)

In few places have railways done more for Geology than in the neighbourhood of Bath. Formerly Geologists had to be contented with quarries and wayside cuttings, which afforded but imperfect glimpses into the underlying strata. For often the material to obtain which these excavations were made consisted of some one particular bed, admirably adapted for its purpose, but frequently destitute of fossils, the master keys to unlock the history of the various formations. Those sections, too, whence our forefathers of the hammer have derived their knowledge, are frequently so covered with the overgrowth and accumulated *talus* of past years that it is next to impossible to recognise even their localities.

Hence we are particularly grateful to that iron necessity which ruthlessly pushes its way through hill and dale without let or hindrance, opening up many a rock surface, and exposing many a *passage bed* hitherto hidden. It is more especially in this opening up of *passage beds*, where one formation dovetails into another, or passes from one condition gradually into another—from deep to shallow water sediment, from clays to sand or shingle—that the railroads in our neighbourhood have done us such good service.

I will then this evening take you with me in a geological walk along the Bath and Evercreech line, from the point where the line diverges from the Great Western Railway, so far as Midford, resuming our further progress on some other occasion.

The first point then where we pause, shall be on a knoll of rising turf not far from Twerton Gaol, and at the distance of about half-a-mile from the river Avon. Standing here at an elevation of some 89ft. above the level of the present river, we should hardly expect to meet with gravel, but on looking into the cutting we see men at work in a fine bed of that material ; in fact the whole of this rising ground is made up of a gravel deposit. How and whence then did this gravel come so far above the present bed of the stream ? The Avon, as Sir Roderick Murchison said, is now the "mud-collecting Avon ;" can this gravel then be water-born ? If so, the features of the landscape must have been far different to what they are now ; and indeed, great changes, both in the climate and the outlines of the surface, have taken place since then. This is evident from two facts which a little investigation discloses. We look more closely at this gravel and see that it consists of a mixture of the *débris* of the various formations in our immediate neighbourhood, with here and there remains of rocks which are to be sought for at a considerable distance. We find for instance rolled pebbles of Oolite and Lias, the *débris* of our surrounding hills and valleys ; lower down are rolled and sub-angular flints, with occasionally a small rolled pebble of chalk, for these we must look to the more distant Chalk hills as the source ; still lower down we come upon rounded and sub-angular pebbles of Mountain limestone and reddish sandstone, for these we must go to our Mendips and the Coal Measures ; and finally, at the base of all, resting slightly buried in the mottled clays (about 5ft. thick), are sub-angular masses of a hard quartzose greenish sandstone, and large boulders of Inferior Oolite. One of these measured during a Tuesday's walk was 2ft. 5in. long, 2ft. 4in. broad, and 1ft. thick, containing rather more than $5\frac{1}{2}$ cubic feet, and weighing about $7\frac{1}{2}$ cwt. (reckoning 156lbs. to a cubic foot).

Now what do we argue from these facts ? First, that this thick bed of gravel, if deposited by water, indicates that the

streams or rivers to which it is due must have flowed down from their sources with greatly intensified velocity to what they do at present ; and secondly, that the agency which transported these large Inferior Oolite boulders was most probably ice. We have long been desirous of tracing, if possible, evidences of ice action in our neighbourhood. Mr. Charles Moore has already before this Club stated his opinion that the evidence of ice action may be traced in the deep grooves and channels which exist on the surface of the stiff Liassic clays on which these gravels rest.

Hitherto I have not been sufficiently fortunate to meet with these traces, but the association of these partly-rounded Oolitic boulders with blocks of Green-sand, and their position at the base of the gravels resting on the Liassic clays may be accounted for by the carrying power of ice, and thus support Mr. Moore's view. I have attempted to answer the "how" and the "whence" of the gravel beds ; we must not forget to speak of their fossil contents. Recently, from the section now under consideration, have been brought to our museum several portions of Mammalian remains, one perfect molar of *Elephas primigenius*, and a portion of a second, the astragalus and molar of a *bos* (prob. *primigenius*), together with portions of other bones undeterminable. During a recent visit I was fortunate in securing a piece of deer's horn. These remains were found in a band of yellowish arenaceous clay about midway in the section.

SECTION MOORFIELD CUTTING.

Bath and Evercreech Railway.

							Ft.	in.
Humus and Oolitic wash	...	...	...	...	...	...	0	11
Sand	...	...	...	...	...	...	0	3
Gravel	...	...	...	...	...	...	0	11
Yellow arenaceous clay	...	...	...	...	...	...	0	3
Gravel, with lenticular masses of yellow arenaceous clay, with								
<i>Elephas primigenius</i> Bos and Cervus	...	...	...	...	...	...	3	6
Large Inferior Oolitic boulders, with sub-angular blocks of								
quartzose Green-sand, resting on mottled clays	...	...	...	...	...	...	4	2
Light blue clay, with bands of iron stone	...	...	...	...	...	...	5	0

The gravel consists of flints rolled and sub-angular small rounded Chalk pebbles, Forest marble, Coral bed of Inferior Oolite, White and blue Lias. Red and pinkish sandstone, fine and coarse grained yellow saccharine sandstone, both from the Millstone grit probably. Mountain limestone and ferruginous nodules. In a band of sand here and there overlying the clay, land and freshwater shells (*Bythinia*, *Pisidium amnicum* and *Zonites*,) were found a few inches above the clays, and below the Mammalian bed.

We now pass on through this gravel which occupies a trough-like depression in the clays, the deepest part of the trough coinciding with the highest part of the knoll and the thickest deposit of gravel, and come to thick beds of light-blue clay with a patch or pocket of gravel resting on them just before entering the tunnel under Bloomfield Place. Aneroid measurement gave this gravel a height of 152ft. above the river, or 63ft. above the Moorfield cutting. The embankment of clay is here about 20 or 30ft. in height, and has running irregularly through it about midway a hard compact blue irony limestone stained reddish in the centre. Entering the tunnel, which is cut out of the Sands principally, we find about 50 yards from the entrance the sleepers for the rails resting on a large block of stone, Oolitic and ferruginous outside, 7in. to 12in. thick, evidently *in situ*. From this I obtained a specimen of *Ammonites serpentinus* characteristic of the Upper Lias. This block rested on the light-blue clays. Now comes the question,—What are these clays? Are they the *Upper* clays of the Lower Lias (they certainly are not the *Lower* clays of the Lower Lias), or are they *Upper* Lias Clays, which from a thickness of 200 feet on the Yorkshire coast are said to thin out in our neighbourhood so rapidly, that when exposed (which is rarely the case) they are “barely traceable in a band a few feet thick.” If this is so (vide Phillips Geol. of Oxford, &c., p. 117), which I am inclined to think possible, then we have here one of the best exposures of Upper Lias which have yet been.

opened up. However, let us see what the other side of the tunnel has to show us. Emerging to the daylight we come to a most interesting section of Sands, and one which, owing to a recent discovery,* will perhaps tend as much as anything to throw light on a much disputed point in geology. The question is, to which formation do these Sands belong? "To the Oolitic," say we of the West with William Smith and Charles Moore at our head. "To the Liassic," say those of the East with Dr. Wright as their champion. Who then shall venture to decide between these doughty combatants? Let us see what the section has to tell us. We have then before us an embankment some 40ft. in depth, and consisting in descending order first of some four or five feet of soil, with Oolitic debris—the subaerial gravel, or wash, from the hill above; this is succeeded by some 30ft. of yellowish much-disturbed green micaceous sands, with interrupted bands of hard, compact, calcareous stone. The Sands become highly ferruginous at the base and rest on a bed of stone some 2ft. in thickness; Oolitic and ferruginous outside, and full of fossils in which the *Cephalopoda* predominate; hence called the *Cephalopoda* bed. This is succeeded by bands of buff-coloured clay and stone, some 19in. thick, resting on a 7in. highly ferruginous and nodular bed of rock, containing similar fossils to the top bed, with nodules of ironstone and *belemnites*. This last bed rests on light-blue clays, a continuation of the same clays in the lower or West end of the cutting. We are here in the presence of a series of those debatable beds, called *junction beds*, which make our neighbourhood so important in a geological point of view—beds which represent the dying out of one formation and the coming in of another, and which are consequently of especial interest in their lithological and their palæontological aspect. We

* It is but right, however, to state that since this was written Mr. Etheridge has thrown considerable doubt upon what Mr. Moore, myself and others deemed an undoubted portion of the young shell of *Rhynchonella spinosa*.—H. H. W.

have here then before us the *passage beds* of two formations, the Liassic and Oolitic ; but where are we to trace the exact point where the one ceases and the other begins? We know that the Lias is represented here by the *Cephalopoda bed* on which the Sands rest. But what are the Sands, are they Liassic or Oolitic? *i.e.*, does the fauna contained in them represent an Oolitic or Liassic character. Now it so happens that these Sands in our own immediate neighbourhood are singularly destitute of organic remains calculated to throw light on this point; in fact, I know not if any organism has ever actually been found in the *Sands themselves*, but in the hard bands of calcareous stone which come in here and there we have been more fortunate. And during one of my visits to this section I found various organisms, and the portion of a shell which in my opinion and in that of Mr. Moore belongs to the species which is characteristic of the Inferior Oolite *i.e.*, *Rhynchonella spinosa*.

Since then I have found portions of Ammonites which have an Inferior Oolite character about them.*

If then these turn out to be true suppositions, we may I think come to the conclusion that the Sands as represented in our vicinity are Oolitic, whatever others may have to say respecting those in the neighbourhood of Cheltenham. It is but just here to say that there is a third view lately put forth by Professor Phillips, which, from his well-known wisdom and judicial caution, may perhaps after all be the safest to adopt, *i.e.*, that the Sands feebly tie together these great Liassic and Oolitic deposits and may be called "Midford Sands," because, as he says in a foot note to his admirable work on the geology of the Thames Valley (p. 109), "They were first discovered and studied by Smith in

* Mr. Etheridge has since kindly named these for me as *Am. striatulus*, *Am. aalensis*, and *Am. crassus*, and states that they are typical of the Upper Lias. Mr. Charles Moore, however, considers them to be common to the Lias and Inferior Oolite.

the picturesque cliff which overhung his house at Tucking Mill, near Midford."

Leaving this section we pass on to the cutting behind Mr. Moger's house, where the Sands are seen to thin out and are capped with a bed of Inferior Oolite some five feet thick, Conglomeratic at the base, and containing the usual characteristic fossils, *e.g.*, *Rhynchonella spinosa*, *Trigonia costata*, *Astarte excavata*, &c., &c. Thence we enter the tunnel cut out of the "Midford Sands," where for the present we must remain until we pick up the thread of our geological ramble on some future occasion.

Whilst asking your indulgence for the imperfect way in which I have brought these notes before you, and being sensible of the dulness of the subject to those who have not studied geology through lack of opportunity or other causes, I nevertheless feel that no apology is needed, even to ladies, in the present day for bringing this increasingly interesting study before them, for amongst their ranks are to be found many who ply both pen and hammer most ably and successfully in aid of this noble science.

Address to Members of the Bath Field Club. By REV. PREB. SCARTH, M.A.

(Read April 23rd, 1874.)

In the absence of our gifted and highly esteemed President who has so often addressed us on these occasions, and given to us his views on the object of our meetings and excursions, and set forth with his usual ability and kindness the purposes for which Clubs of a similar kind have been instituted, and directed our attention to subjects worthy of investigation; as well as informed us of the progress which Science has made in opening out the Secrets of Nature; and disclosing the wonderful workings of Creative Wisdom; I am called upon this day to occupy his position, and to take up another subject, and seek to do for

Archæology what he has done for Science and Natural History. Would that I could venture to hope that I could express in brief space as much as he has done, and in the same lucid and polished diction ; but I must be content to place before you in homelier language, and in shorter compass, the results of modern Archæological achievement. The field is so varied, and the matter so plentiful, that I must restrict this address chiefly to our own country, and to our own locality, as were I to enter largely upon foreign discoveries, we should be carried far beyond the limit of an ordinary address. The minds of educated men are now so alive to the importance of Archæological Investigation, and such an interest has been stirred up both by our own and Foreign Archæological Societies, that discoveries pour in from all quarters, which keep our scholars very actively employed.

It has been observed that—"By Archæology is understood the study of all times and places, and it divides itself into several branches, as Palæography, or the study of the forms of letters and inscriptions ; Epigraphy, or the consideration of their contents ; and the study of figured antiquity, or of the shapes and meaning of sculpture, painting, and symbolical representations. The main objects of Archæology are to preserve from destruction the precious relics of the past, and to aid in the development and discovery of historic truth. History itself is dependent on the existence of contemporary monuments, and the annals of some nations, as the Egyptians, Assyrians, Phœnicians, and other Semitic races, are preserved on monuments alone."*

FIRST THEN, AS REGARDS EGYPT.

There has been a great advance in the knowledge of ancient Egyptian monuments, during the last fifty years, and of hieroglyphics during the last twenty-five. This has been accomplished

* See inaugural address by Dr. Birch, delivered to the Archæological Inst. Section of Antiq., July, 1866. Archæological Journal, vol. xxiv.

by the labours of MM. de Rougé, Chabas and Devéria in France. MM. Lepsius, Brugsch and Duemichen in Prussia.

Mr. Goodwin, Dr. Hinks, Mr. Le Page Renouf, and others in this country.

“The structure of the language, the meaning of the words and texts, are now (says Dr. Birch) thoroughly understood, and the contents of all documents can be interpreted.”

Prof. Lepsius discovered at San, or the ancient Tanis, a *bilingual* tablet (Greek and hieroglyphic), nearly eight feet high, like the Rosetta stone; the date is B.C. 238, about 50 years older than the latter.

“It records the benefits conferred by Euergetes I. on Egypt, the priests and the people, the restoration of the statues taken from Egypt by the Persians, and the alleviation of the misfortune of a deficient Nile and impending famine by the generosity of Ptolemy and his consort Berenice.”

A new tablet of Abydos has also been discovered. In 1866 M. Duemichen discovered on a wall of the Temple, a list of seventy-six royal names commencing with Menes the first monarch of Egypt, and ending with Sethos I. of the nineteenth dynasty.

SECONDLY—ASSYRIAN, BABYLONIAN, PERSIAN INSCRIPTIONS.

In 1800 Grotesfend in Hanover made the first attempt to decipher the cuneiform character.

The discoveries of Botta in 1842, and of Layard in 1845, and the subsequent excavations by Loftus, Rassam, and Rawlinson, of the Palaces of Nimroud, Khorsabad, Konyunjik, and other localities, built by Sargon, Ashur-bani-pal, Ashur-izir-pal, and Sennacherib, have thrown new light upon Assyrian history.

“Thousands of fragments of terra cotta tablets, deeds, annals, petitions, from the archives of Konyunjik, now in the British Museum, enable the decipherer to discover their hidden meaning by the opportunity of comparison.”

"The cuneiform writing (says Dr. Birch) was used for several languages, the oldest of which, the so-called Accadian, is referable to the Turanian family, while the Babylonian and Assyrian are allied to the Semitic, the Median to the Turanian, and the the Persian to the Zend."

On the obelisk of Shalmeneser is represented the tribute of Jehu ; on the tablet of the same monarch discovered at Kurkh, near the head waters of the Tigris, is found the name of Ahab.

The historical cylinder-prism, and inscription from Korsabad, record the campaign of Sennacherib against Judæa. (See Postscript.)

THIRDLY—PHENICIA.

Recent examinations have discovered Phœnician inscriptions on the bronze vessels and ivory fragments of Nimroud. The same language has been discovered on the clay cuneiform tablets of Konyunjik.

Through the Phœnicians who were traders the civilization of the East passed to the Greeks. Their remains are to be sought rather amongst those of other nations than upon their own soil. "Their galleys ploughed the purple waters of the Mediterranean, descended to the Egyptian Naucratis, threaded the Isles of the Ægean, trafficked in the ports of Spain, and probably passed Gibraltar ; . . . to the poor and distant Britons, they sold beads and trash goods, called "rôpé" or rubbish by Strabo, in exchange for tin and other products of our Isle, and recently glass beads of opaque and veined glass, resembling those found in the tumuli of the Celts, have been brought from Tyre itself."

I need only here refer to the glass bead discovered in the tumulus at Marksbury, and recorded by the Rev. John Skinner who made a drawing of it. (See Som. Arch. and Nat. His. Soc. proceedings for 1861-62, p. 185.)

FOURTHLY—GREECE AND ASIA MINOR.

"The excavations of Mr. Newton at Halicarnassus have ex

humed the Mausoleum, and added to the examples of Greek art a brilliant series of sculpture and reliefs of the later Athenian School which flourished about 350 B.C.

“The more archaic sculptures of the *Hiera Hodos* or Sacred way at Branchidæ near Miletus, removed by Mr. Newton to England, have formed an important contribution to the known examples of Ionic sculpture, as the inscriptions from the same site have done to Greek palæography.”

Examples have also been procured from the Rhodian Camirus, and later still portions of the Temple of Diana at Ephesus, through the exertions of Mr. Wood.

The efforts of Dr. Schlieman in endeavouring to ascertain the site of ancient Troy have imparted new interest to the Troad, an interest indeed which will never die so long as

“Immortal themes which could beguile
The blind old man of Scio’s rocky isle”

are made the study of our youth. But though he may not have succeeded in ascertaining the undoubted existence of the site of that city, yet he has come upon remains of the deepest interest to the archæological student, and his perseverance may eventually be rewarded in the recovery of the site of ancient Troy. The efforts of Mr. Parker at Rome must not be overlooked. By his exertions the most ancient portion of the walls have been brought to light and careful photographs made of them, and the later portions also, built under the emperors. The series of photographs, now accessible to all, are of the greatest value to historical and archæological students; he has also obtained photographs of the most ancient frescoes in the Catacombs, and his elucidation of the ancient aqueducts is also of much value, and the system of water supply to the city.

The investigation of the Megalithic remains of India, and the examination of barrows in the East, have accumulated objects by means of which we are enabled to trace the affinity existing between modern races and those which once occupied the regions

in which we live, in very remote periods. We can trace the progress of the great Indo-European family of man by the vestiges left behind.

While Sir John Lubbock and Mr. Evans have been collating and comparing remains found in our own island, in Europe, and in lesser Asia, others have pursued the same work in India, China, Japan and Africa. While the exertions of Mr. Blackmore and his public spirit has brought within easy reach the results of the examinations of the huge mounds in the Mississippi Valley, so well recorded in the proceedings of the Smithsonian Society, the formation of the Blackmore Museum at Salisbury has given a great impulse to the study of Prehistoric archæology. Thus while Geological investigation is being pushed on vigorously in every accessible region, and natural history has its devoted servants, Archæology is no less active in producing results equally valuable; Philology under the guidance of scholars like Max Müller and the Germans is tracing out analogies in language which confirm previous history, and at the same time verify Archæological investigation. Modern research has established an affinity between Egypt and Assyria, and has shown how the conventional art of the one has acted upon the other. I would only for a moment allude to the institution of a most valuable Society which has lately risen into being, the Society for the Cultivation of Biblical Archæology, and state that the papers read at their Meetings have been those of eminent scholars, and have thrown much light upon subjects of the highest and holiest interest.

Quitting now the efforts that the great scholars and scientific travellers of our land are making, I must cast a glance at the achievements of our English and Scotch antiquaries, and remind this Club how much has been done at Silchester, since that deeply interesting spot was visited by the Club, under the guidance of Mr. Joyce, to whose energy is owing the disinterment of an ancient Romano-British city, the plan

of its streets, the arrangement of its public buildings, and the domestic convenience of its houses ; not to mention the remnants of industry and art, as well as coins and military ensigns, which have been brought to light. The generosity of a noble Duke, whose family name is revered by every Englishman, has enabled Mr. Joyce to do at Silchester what might have been done at Wroxeter had the same spirit prevailed in the county of Salop, with the same perseverance and industry !

The Society of Antiquaries of Newcastle-on-Tyne have during the present year put forth the last number of the "*Lapidarium Septentrionale*," a work of much value to the student of Britanno-Roman antiquities. We owe this work to the energy of Dr. Bruce who for many years past has given his attention to the Roman remains in the north of England, and has very diligently recorded all the existing fragments and elucidated their history. The drawings are admirably executed. In this work he has been aided by the liberality of the late Duke of Northumberland, the late Earl of Lonsdale and others, and a most valuable contribution has thus been made to our knowledge of the Roman occupation of Britain.

Nor has this work been confined to our own country, it has called forth a kindred spirit in our Colonies, and an able scholar, the Rev. Dr. McCaul, President of University Coll., Toronto, has put forth an excellent work on Britanno-Roman Inscriptions as well as aided Dr. Bruce in the preparation of the "*Lapidarium*" of the Roman wall ; while in Germany Professor Hübner has published the "*Inscriptiones Britanniae Latinae*," forming part of a larger collection, and the Roman coins struck in Britain have been excellently illustrated by the Count de Salis.—(See *Arch. Jour.*, Vol. XXIV., p. 149.)

In a review of Professor Hübner's work in the *Canadian Journal* the learned writer states that "we have in that volume for the first time collected all Latin inscriptions found in Britain on all the varieties of material on which they are cut, or stamped,

or scratched." The work forms the seventh volume of the "Corpus Inscriptionum Latinarum" published at Berlin under the auspices of the Prussian Royal Academy of Letters.—"His readings of the text are of the utmost value, and his expositions generally satisfactory."

Mr. Wright, who laboured long to accomplish the disinterment of Uriconium, but only succeeded in the examination of a small portion, has recorded all that was brought to light in the process of investigation in a recent volume published in 1872; but who shall say what remains yet sealed up within that circuit of three miles of entrenchment which can still be traced!

This investigation has not been without valuable collateral results, Museums have been formed, and many who disregarded the coins, pottery and portions of implements found on their estates, or in their neighbourhood, have been led to preserve them, and to encourage others to bring what they may have found, and rewarded their efforts and care, so that many coins, pigs of lead, and portions of bronze utensils which formerly found their way into the melting pot, or were idly cast aside, are now preserved and collected together in Museums. These are full of interest and instruction, and at first we do not always know their value; of this I will give a good example.

In this city (Bath) many fragments of Sculpture, large blocks of cut stone, altars and portions of inscriptions have been found. For years they were treated with indifference, but happily a place was found wherein they were deposited. Many were drawn and engraved through the spirit and good judgment of the two Lysons, yet we have reason to believe that other portions were neglected, and some that were found and recorded have been lost; but out of those that are still existing, and from the drawings of those portions now not forthcoming, a member of our Club, who from his modesty and diffidence is seldom seen at these our annual gatherings, has been able to reconstruct the portico and pediment of one of the ancient temples that in Roman times

adorned this city, and also the portico or entrance to one portion of the public Baths. This is no work of imagination, but the result of accurate measurement and close examination of existing portions, it is the result of a perfect knowledge of his art, and could only have been done by an experienced practical builder. It remains to be seen if any of his statements can be shaken, but it appears to me that no stone has been put into its place without sufficient proof of its having anciently stood in that position. We have therefore recovered the precise form of two Roman buildings, and these from certain preserved fragments which, had they been destroyed, we could never have known the kind of edifices that adorned our very ancient city. We can now without much effort picture to ourselves *Roman Bath*, and this is due to an active member of our Club. Surely we owe him thanks!

But while Bath has yielded its objects of archæological value in no small measure, other portions of this deeply interesting county have not been without their supply. To the city librarian of Bristol, Mr. Nicholls, we owe the preservation of a very interesting discovery within the Roman Station at Sea Mills, probably the ancient Traiectus of the Romans. At all events it was he who called the attention of archæologists to it. This rude sculptured stone, an engraving of which has just appeared in the last number of the Journal of the Archæological Association, has called forth much interest on account of its being not improbably Roman-Christian. There are very strong presumptive indications of this, as is allowed by the best students of Romano-Christian antiquities. It has excited interest not only in this country but abroad. We are thankful for its preservation, and it may probably lead to further discoveries.

The re-smelting of scoria left by the Romans among the Mendip Hills has led to discoveries of Roman mining implements, but it has done more, it has brought to light pigs of lead, bearing the imperial stamp, and dating back to the earliest con-

quest of our island under the Emperor Claudius. The silver coins not unfrequently discovered go back to the Triumvir Antony, and reach down to Probus and Tacitus, and probably later. I have already described this pig of lead, the heaviest yet found in England, which was disinterred last summer. I need not dwell upon the Roman remains of this locality, having already brought some of them under your notice, but I would suggest some practical good which may be effected by our Club.

We ought in the summer to visit these workings, we ought to encourage the overlookers to preserve these relics; and we ought, if possible, to get a clear idea of the extent and duration of the workings made by the Romans. From the date of their leaving this island to the present time the workings seem to have been abandoned, probably under the idea that the lead was exhausted; and so the virgin ore appears to have been, except at a great depth. In mediæval times there was indeed an ecclesiastical establishment here, but they seem to have disregarded the mineral produce, as no mediæval remains have been found, or any traces of previous Saxon occupation. It is only in recent times that increased skill in smelting the ore has enabled the miner to obtain a sufficient return from the scoria of the Roman workman; and now in the process of gathering up the fragments of the Roman labourer are found these remains of Roman occupation, pigs of lead, remnants of every kind of pottery, coins, and indeed all the indications of a long and well-appointed occupation.

Could we extend our investigations across the Glastonbury moors through what are called the "Turbaries," and along the course of the Severn Sea to the pleasant range of the Quantock hills, and in this district collect and investigate all that is of antiquarian and scientific interest, we should have a very profitable and pleasant labour, and find employment for many excursions. I will only now make a suggestion, that including Clevedon and its neighbourhood in one of our excursions, we should in another examine the inland portion of the county, embracing Charterhouse on

Mendip ; and that a third and a fourth should carry us still lower in the direction of Bridgwater and Taunton, where much is to be found that would reward our investigation. Having made these suggestions, I will now cease, only suggesting to the Club that they must never lose sight of the object of its formation, which is to investigate and to record whatever may be of interest either in natural history or antiquarian learning, so that matter may be found not only for mutual improvement and pleasant relaxation, but for future history, and for the benefit and instruction of later times.

POSTSCRIPT.—While the foregoing address has been passing through the press further Assyrian discoveries have been made by Mr. George Smith, of the Department of Oriental Antiquities in the British Museum. These have now appeared in a work published by Samson Low & Co., and give details which cannot but prove deeply interesting to all Archæological or Biblical students. Many Tablets have been added to the number found by Mr. Layard at Nineveh. These have been deciphered, and we have in them records which not only confirm the Inspired Narrative, but also fill up omissions in the records of profane history. In 1872 a Lecture was delivered to the Society of Biblical Archæology by Mr. Smith on the Assyrian Tablets which record the Deluge ; other portions have since been recovered by him at a subsequent visit to the East, and of these he has now given a more perfect record.

The Battle of Lansdown, A.D. 1643. By E. GREEN.

(Read January 15th, 1875.)

In the year sixteen hundred and forty-two a Civil War broke out in England.

The causes were many and some of them of long standing. Summarised they may be said to have been the determined and continued efforts of the King to make himself despotic.

The Houses of Parliament being equally stubborn and determined in their opposition to his proceedings, it eventually

only remained for the two parties to fight out their differences, and both accordingly raised forces for this purpose.

The Parliament called the country to fight for Religious and Civil Liberty against the Popery and Tyranny too evident in Royalty; and whilst Somerset may claim that this resolution was chiefly induced and brought about under the leadership of Somerset men, Somerset must also claim the honour of the first encounter and the first blood shed in this ever eventful war.

For the present purpose however these events of 1642 must be passed over, and coming to the month of May, in 1643, a Royalist force gathered in Devon and Cornwall largely by the exertions of Sir Ralph Hopton, of Witham Friary and Evercreech, after many victories in those counties, is advancing rapidly, intending to pass through Somerset and join the King at Oxford.

The whole county of Somerset which from the first had risen against the King was quickly called upon to make preparations for resistance; but before these could be so completed as to be of service, or any sufficient force could be organised, the Royalist troops, consisting of three thousand excellent foot, five hundred horse and three hundred dragoons, arrived at Chard. Here they were joined on the 2nd June by the Marquis of Hertford and others from Oxford with a thousand more newly-raised foot, sixteen hundred horse and seven or eight field pieces, the two forces making together four thousand foot, about two thousand one hundred horse, three hundred dragoons and sixteen cannon.

From Chard they went to Taunton, then by Glastonbury to Wells, and so meeting with an ineffectual opposition all the way reached Frome towards the end of June and there rested for a time.

The command in chief for the Parliament to oppose them was offered to Sir William Waller, but at first he was inclined to refuse it, as neither men nor money appeared to be forthcoming for him. Being pressed however and assured that both should be provided, he accepted, although with many misgivings and very unwillingly.

Making Bath his head-quarters, and getting what support he could from Bristol, he at once with his usual energy set about raising and organizing a force fit for an encounter, but after using every endeavour, and exhausting every means, by the 24th of June he had not five hundred foot.*

The difficulty about money too was almost insurmountable. This department was entrusted to Mr. Ashe, of Freshford, but the neighbouring hundreds being already eaten up he was greatly perplexed at the small sums he received. The Parliament in committee, on the 22nd June, sent to Mr. Ashe two thousand pounds, and considered further how a regular payment could be made to him, at the same time acquainting Sir William Waller with the great solicitude on his behalf. Sir William himself was also busy on this important matter, and went purposely to Bristol on it, his men meanwhile keeping a solemn fast at Bath.

The following letter to Col. Fiennes, the governor of Bristol, which seems to bode no good to the party named, will show how pressing this difficulty was :—

"I beseech you, take care of this shippe, I can scarce tell what to doe for
"money. Good Sir helpe me, make what you can for the payment of these
"companies, otherwise I must give over. There is one Capt. Phair that
"is gon to Bristow, he found a sume of money, some say a very great one,
"he is now with you to secure his mony. I intreate you would improve
"your best to find out what it is. Desire him from me to make haste to his
"colours, but good Sir, if it is possible find out what he leaves amongst
"you. I doubt not of your best assistance and will ever be your faithful
"servant."†

WILLIAM WALLER.

Being joined by Col. Popham, Col. Strode and others, with both horse and foot, retiring from about Glastonbury and Wells when their enemy passed by to Frome ; and also by Sir Arthur Haselrig from London, with his regiment known as the regiment of lobsters from the bright iron shell or cuirass which they were

* Clarendon MSS., 1705, Ed. Cooke to Col. Fiennes.

† Clarendon MSS. 1712.

the first to wear, Sir Wm. Waller's force became fairly strong in horse ; but after every addition, he still remained badly provided with foot, having only some three to four thousand, but few of whom had seen much former service and the majority being the untrained country people of the district.

The royalists on the contrary well armed and flushed with continual victories, and full of contempt for their opponents, chose to diverge from their direct route to Oxford to invite an encounter about Bath. The result of the meeting was anxiously looked for in London as it was well known the victor would for some time be master of the west.

Both parties had their scouts and outposts well in advance. On the 30th June there was a skirmish between some of these in the Ham meadow by the river at Claverton ; and three of the Parliament soldiers, with one royalist slain there, were buried on that day under the west wall of Claverton churchyard.*

On Sunday, the 2nd July, the royalists left Frome, and coming upon a party of their opponents near Farleigh, after a fight lasting for three hours, defeated them, the losers however retreating in good order towards Bath.† On learning this, with the further information that his enemy was making for Bradford bridge where two ways meet,—one going to Oxford, the other to Bath,—Sir William Waller sent out Major Dowet by night with three hundred horse and foot to secure the bridge, but not knowing his way, and the night being dark, the major was discovered and in the morning successfully attacked and defeated with the loss of ten men killed and two "hammer pieces" taken.‡

The same night Waller moved a part of his army, horse, foot, and dragoons, over the river under Claverton House ; where, besides the "ford," he had made a bridge with a redoubt on the "hither" side to defend both. With this force during the night he took

* Collinson.

† Parliament Scout, No. 3.

‡ *Mercurius Aulicus*.

possession of the high ground at Monckton Combe, and laid an ambushade in a woodland walled ground at the foot of the hill. In the morning he advanced strong parties of horse upon his enemy's outposts, but these being held in check did but little service, and after an hour or two the Cornish foot had beaten them back and also the ambushade. The whole force then marched for the hill, the Parliament party retiring in good order before them, and then the royalist commanders discovered they were fighting only an advanced guard, and that Waller had drawn up his main body on Claverton down, having behind him the bridge and redoubt before mentioned. Prince Maurice (a nephew of the king) quickly determined to secure this pass also, and using for the service the greater part of his horse and foot he succeeded just as it was night; his enemy, in the darkness, continuing his retreat to Bath and Batheaston, and then up the hill to the top of Lansdown.

Sir William Waller, who was considered to have the greatest ability and judgment in choosing his ground, and was known as the best of generals for shifting it when not master of the field, occupied the south side of the down, opposite his opponents, who remained in the fields below, and showed them his whole force, the valley between the two being steep and difficult for either to cross.*

At a council of war, held about midnight, the royalist officers debated whether they should attempt the hill or not that night; and it was decided not to do so on considering the craggy narrow passage up, that only a part of the army was then present, and that the remainder, if surprised in the night after so hard a day's labour, might not be found in a good position for defence. It was resolved rather to move back to within Batheaston bridge, to quarter the troops thereabouts as best they could, and early the next day to try and drive their enemy from his high and advantageous position.†

Accordingly in the morning, but with a "little more haste than

* Parliament Scout, No. 3. † Clar. MSS. 1738-4, Hopton's account.

was altogether expedient," Sir Ralph Hopton's men, horse and foot with their baggage, moved towards Lansdown. Waller meanwhile watched them from the brow of the hill observing their motions, and with great industry and care endeavoured to annoy them. Their intention was consequently foiled, and they soon found themselves in a helpless position, unable to escape from or reply to the cannon, encumbered with carriages which were most troublesome, and in a field where an advance seemed impossible, and from which a retreat was most difficult. After receiving some damage from the artillery, about one o'clock in the afternoon much distressed for provisions and short of ammunition they began to draw off to Banner down in retreat to Marshfield, hoping to tempt the Parliamentary commander to follow them, and boasting they would yet be in Bath that night—"forgetting that the waters of Bath might be too hot for them, and might produce a fatal fever." The command for this movement was entrusted to Sir Ralph Hopton, who, as best he could, first sent off the cannon and carriages well protected through two narrow lanes which led towards Marshfield, guarding the entrances to both and lining the hedges with a thousand musketeers. The remainder afterwards marched off in divisions leaving a forlorn hope to protect the rear. Seeing only these left on the field some troopers descended the hill and attacked them; at first with some success, but being drawn into the ambuscade of musketeers behind the hedges they were in the end driven back without any advantage.

That night the royalists pitched their camp about Marshfield and Frisnoll hill, sending out parties of horse to scour the country and using every precaution to make their rest secure.* Their loss for the day was reported as only three hundred-weight of bullet and Captain Thin of Longleat taken prisoner.

Thus for the greater part of this day, Tuesday, the 4th July, Sir William and the entire Parliamentary force had been able to view the whole strength of the royalists under Sir Ralph Hopton

* Clar. MSS., 1738—Hopton.

and Sir Bevil Grenville as they lay in the valley below, and whose numbers consequently could no longer be disguised.

Sir William now moved from the Bath side of Lansdown to the further side which looks towards Frisnoll Hill, and there quickly raised breastworks of faggots, earth, straw, or any and every other thing available, behind which to put his newly joined country men. From this point he saw his enemy moving towards Toghill, so fitly named just now, for there was a "fierce and furious toggling" there before they parted, and where about the "leaping stock" was a plain leading towards Lansdown.

The next day, being Wednesday the 5th July, early in the morning a part of the royalist force was seen to advance and halt in a hollow under the hill, and some skirmishing ensued with the respective outposts. About eight o'clock Sir William Waller sent out Captain Butler to drive them back, and following him went four hundred of Sir Arthur Haselrig's cuirassiers, two hundred under Major Dowet as a support, and two hundred under Col. Carr as a reserve for both. Captain Butler quickly and successfully drove in the foremost party and then advancing boldly charged in on the main body. His charge, most gallantly made, was as firmly received, but getting galled by the cannon he was soon compelled to withdraw. Doing this however in good order, he quickly rallied and reformed. Next, the Haselrig men were advanced, and charging with their usual success completely routed twob odies of horse, and forced them to retire in confusion for succour.* The great repute of these men for firmness and solidity so disheartened the defeated troopers that many deserted and ran. No encouragement of their officers could get them to show again with their usual confidence and indifference, and had not the foot protected them at this time they must have been almost annihilated.

Sir Bevil Grenville with his Cornish foot and Sir Nicholas Slanig next advanced, but Waller by this time had lined the

* *Mercurius Aulicus.*

hedges so thickly with musketeers, that their troopers unable to stand against the galling and hidden fire were driven back disorderly to the rear of the foot ; but these, though the broken horsemen were scattered between them, kept their ground and well preserved themselves until supported by the Earl of Carnarvon.* Aided by the artillery Sir Nicholas Slaning with three hundred foot once more attacked, and now managed to disorder and beat off Waller's reserve of dragoons. At the same time Prince Maurice and Lord Carnarvon winging their troopers with the Cornish musketeers were successful against the skirmishers, drove them from the hedges, and after charging three times forced them back and pressed them into a lane which led over Toghill. Here by good fortune they were succoured by a strong reinforcement under Col. Burghill, who after fighting most desperately and enduring some heavy charges turned the tide of victory and the royalists were again entirely defeated, routed, and chased. In this encounter Col. Burghill received a wound in his right arm just as his sword was at the throat of "my lord of Carnarvon," who was wounded by a shot in the leg.

Thus was the fight variously maintained for three hours when those engaged showed evident signs of weariness. Waller's weakness in foot now told against him, and the further relief at his disposal being the new, raw, and undisciplined recruits, these when brought into action proved useless and cowardly and quickly turned and fled.

A "young spark," one Mr. Hill, perceiving this attempted to check it. Placing himself advantageously he fired suddenly on the fugitives, but getting mixed up with them they supposing him to be of the king's party, gave him in turn "divers shots in "his cloaths," but "not a bullet by providence of God had a "commission to hurt his bodie."

Toghill was now occupied by the royalist foot from whence they poured in on their retreating foe a quick and galling fire ;

* Clar. MSS., 1738-4—Hopton.

whilst the hedges and woods were thickly lined with musketeers, with the intention under their protection of gaining a flank of the enemy on the hill. So driving their opponents from hedge to hedge the road was presently cleared, and the whole army advanced by the broadway direct for Lansdown.

Arrived at the foot of the hill, the position seemed almost inaccessible, consequently there was here some little hesitation; but Waller's guns playing down upon them, the Cornish men, nothing daunted by this great disadvantage, and believing none to be their equals in battle, demanded leave to "fetch off those cannon." Upon this the order was given to attempt the hill and a great number of musketeers were sent out to clear the woods, but the first result was failure, and the horse endeavouring to pass up the highway were also repulsed. Next, Sir Bevil Grenville advanced still hoping, if possible, to attack in flank. Himself leading on his pikemen in the centre, on his right he placed a strong body of horse, as that ground being "mere brushwood and hedges" was most suitable for them; and on his left the musketeers protected by a wall.* With these, marching with tremendous gallantry through a storm of shot large and small, coming too from an enemy entirely under cover, he managed to reach the brow of the hill. But there all further advance was checked by the barricades and breastworks of faggots and earth. Hardly was the brow gained when Waller's horse fell in furiously upon them; but only after a two hours' fierce struggle were they broken and forced off again. Yet they rallied and assaulted again and again. Five times did they thus attack to be four times repulsed,† until at the last, aided by the fire of the musketeers who had by now "crowded up" through the wood, yet, with unimaginable difficulty, the hill was carried.‡

Galled by the hidden fire from the wood the defenders were now retired to their original ground, and then was fully seen the fine plain on which stood the Parliament reserves of horse and foot,

* Parliament Scout, No. 3. † Clar. MSS. ‡ Merc. Aulicus.

and what a splendid battle field Waller had selected, surrounded as it was by walls, and strengthened by works in front, with an approach both narrow and steep.*

Bravely had Waller's men done their work, bravely had the work been done on both sides, but most bravely had Grenvilles' men done theirs ; and now to the wonder of both friends and enemies, the position thus gained was kept with a most indefatigable labour and courage, in the face of the cannon and a storm of small shot and against all the force that could be brought down upon them.† Smartly following up his success, the Parliament horse, after stubbornly sustaining two full charges, failed and lost ground, when Sir Bevil by the aid of his favoured pikemen, with whom he had so often done good service, secured a further advance. Now ensued a most furious struggle, a hand to hand fight, ending in a general *melée* ; in the midst of which after other wounds Sir Bevil Grenville was felled by a blow on the head with a poll axe,‡ many of his officers being already dead at his feet, and so ended his life in as much honour as " mortal man is capable of." Charges too grew hot and frequent ; the " like was never before seen in England." The old soldiers declared the " furious fights in France " were but " play " in comparison with them. Every regiment charged four or five times. So fierce and long had been the struggle that it was only towards evening Sir Ralph Hopton was able to get up some cannon, and under their protection to rally his fatigued and disordered troopers. Sheltered by these guns yet more ground was gained, and on a wider front being shown Waller's men thoroughly weary were retired for protection behind a stone wall previously prepared for such an emergency, being well guarded with cannon and pikes and having in it breaches wide enough for cavalry to charge through, if necessary.§ Each party now played upon the other, but both being soundly battered neither cared to advance.

* Hist. of Rebellion. † Echard. ‡ Hooper Jacob.

§ Clar. MSS.

Sir William Waller, who besides his other duties, had himself charged four times, at this critical juncture seeing that one more effort would decide the day, earnestly commanded and urged his musketeers to come from their shelter ; but these willing enough, and who had done well enough behind the hedges and "straw walls," could not by any means be induced to go out in the open field again.*

Both sides were in fact so exhausted that gradually they both ceased firing and were content to stand still and look at each other, until night coming on a renewal of the combat was impossible.

The firing, which on the hill had commenced about mid-day, continued until nearly midnight, "legs and arms flying apace," by which time all "who had a mind to fight had had enough of it." With the darkness and cessation there came a great silence in both armies ; but about one o'clock the royalist commanders, keeping watch at the head of their troops, detected the approach of both horse and foot marching without the usual sound of drum and trumpet, and soon they received a smart volley of small shot which was answered by a "similar token," and then all was quiet again.†

This salute produced some alarm in the royalist camp. By some it was supposed that under cover of the night Sir William Waller would try and regain his lost ground ; and this idea caused a "general apprehension," as the weary remnant of the army, being now seated like a heavy stone on the very brow of the hill, by one lucky charge might have been rolled to the bottom.‡ By others it was judged to be a last volley before retreating, and these proved to be right ; for finding himself in exactly the same plight as his enemy, when one more attack would have been destruction, and that it was impossible to get his men to move, Waller ordered lighted matches to be stuck in the wall which protected his foot, so to deceive his foe, and then marching quietly, but taking his cannon with him, he retreated his whole force into Bath.

* Parliament Scout. † Clar. MSS. ‡ Clar. MSS.

As nothing further came of the volley, after about an hours' waiting Prince Maurice gave a soldier a reward to go as near as possible to the Parliament quarters to find out the meaning of it. Creeping up and sheltering in the many pits between the wall and the wood, he was able soon to return with the information that lighted matches had been fixed in the wall and whole bodies of pikes left standing upright within, as if held there by the pikemen, and that the camp was empty.

We were glad they were gone, wrote Col. Slingsby, for if they had not, I know who would within another hour.*

By some mistake during the night there "fell out a great "skirmish" amongst the royalist horse and foot; they falling foul of one another and fighting furiously, each party supposing the other to be of the Parliamentary army. Thus, quoting the language of the time, "the Lord dealt with them as with the army of the "Ammonites, Moabites, and the inhabitants of Seir, made them "turn their swords one against the other and slay one another."

At daybreak, the king's commanders found themselves in possession of the hardly contested ground, with some three or four hundred arms, and nine or ten barrels of powder. Having first looked up their plunder, several parties of horse were sent out by different ways to discover the whereabouts of the enemy and soon brought back news that he was safely in Bath. Then, making no attempt to retain the battle field, at eight o'clock all marched away to their old quarters at Marshfield.

Parties of horse were also sent out from Bath for a similar purpose, and about noon some encountered an outpost of the other party with a slight mutual loss. On their return and reporting that the royalists had retired to Marshfield, Sir William Waller at once left Bath and re-occupied Lansdown.†

Sir Ralph Hopton, who was hurt in the arm early in the fight, his men being retired, rode up and down visiting the wounded;

* Clar. MSS. 1738-4.

† Clar. MSS., 1738-4—Hopton's.

and being on Toghill with his officers and some soldiers about him, and standing near an ammunition waggon containing eight barrels of powder, the latter suddenly exploded, killing two captains, and wounding Prince Maurice and about twenty more. Sir Ralph Hopton frightfully injured was put in a litter and carried to bed, being hardly alive and a "miserable spectacle," his head as "big as three and both eyes blinded." The loss of the powder, too, was a serious one as only about nine barrels more remained.* After this discouraging mishap, the men pined with hunger and extremely dejected, "for indeed Sir Ralph was the soldiers' darling," settled down about Marshfield for a few days' repose.

By both sides this fight was fought most gallantly, the Hoptonians as if "each were to be made a Baron or a Knight;" and Waller's men as if "for their birthright, the religion and "liberties of them and their posterity."

The royalist horse were so shattered, that of two thousand who went on the field in the morning but six hundred remained at night.† They had besides to lament the loss of Sir Bevil Grenville which was most deeply felt, and several elegiac poems were written at the time in his honour. On the Parliament side, the horse had been on continual duty for three days, and at the end of the fight without food or water for twenty-four hours, yet they with Sir Arthur Haselrig and his regiment of "lobsters" "fought like Romans;" and Sir Arthur, wounded in the neck, was additionally so severely injured by the fall of his horse under him, shot in six places, that his life was despaired of; and on the 9th July, prayers for his recovery were offered in the London churches.

The number killed on either side was variously stated, neither acknowledging to many but reporting a great loss for the other. One account says as many as seven hundred Hoptonians were slain, and seven cart-loads were seen being carried off the ground. The

* Clar. MSS.

† Clar. MSS, 1738.

wounded were twenty in a house and without surgeons.* Many were buried where they fell, the "gentlemen of quality" being taken to Marshfield.† Another account gives the number as two hundred slain and three hundred wounded.‡ It is hardly possible to get at any certain estimate, but the royalist historians acknowledge the losses as being about equal.

The Earl of Carnarvon's colour or standard was taken, having upon it a Crown and three Roundheads endeavouring to pull it down; over them was depicted a hand brandishing a sword, on which was inscribed for a motto, "God damme, you shall not."§ Many of the troopers, routed by Haselrig's lobsters in the first charge before the hill was won, fled to Oxford; and, as usual in such cases, reported all as lost, recounting as facts many circumstances which they thought likely to happen. Some sixty of their horses were found in the grounds of Mr. Ashe at Freshford, and there secured.§ The next day came a different tale by letter from the Marquis of Hertford announcing a victory, but begging an immediate additional regiment or two of fresh horse and a supply of powder. On receipt of this there was a great glorification with bell-ringing and bonfires, and the Earl of Stamford was at once sent off with five hundred troopers and the necessary ammunition. On the other hand, letters were sent to London, declaring a great victory for the Parliament; and on the 12th July, one from Sir William Waller was read in the House, relating the passages of the battle, and the "great success it had pleased God to give him." A supply of ten thousand pounds was thereupon voted for him, and the monies coming in from the "twentieth part" from London and Westminster were to be paid to Mr. Hodges, Mr. Stephens, and Mr. Ashe for his service. Orders were also sent to Portsmouth, Dorchester and the other places under Sir William's command, to forward him quickly all possible assistance and support.

* The Copy of a Letter from the Mayor of Bristol.

† Kingdom's Weekly Intelligencer, No. 25.

‡ A True Relation of the Great and Glorious Victory, by Sir W. Waller.

§ Certain Informations, No. 27.

But little was done on Friday the 7th, both generals attending to their men and filling up their ranks. Sir William Waller lost no time, but busily recruited from the country round Bath which was so well inclined towards him, and sent to Bristol for reinforcements. His warrants issued to the people called upon them to join him cheerfully, and show their zeal for religion, law, and liberty; and assured them their enemies were so weak and broken they might now easily be routed and the war concluded.*

During this short repose the position of the royalists without ammunition and in a hostile country was certainly critical, and might well have caused the commanders some anxiety. It was probably for some political reason arising from these circumstances that Sir Ralph Hopton endeavoured to open negotiations with Sir William Waller, sending him a "complimental and insinuating" letter, desiring that they might meet and have a conference.† As any such meeting would have been useless, and might have been misconstrued, Sir William declined it, writing in reply;—"The "experience I have had of your worth, and the happiness I have "enjoyed in your friendship, are wounding considerations to me "when I look upon this present distance between us. Certainly "my affections to you are so unchangeable that hostility itself "cannot violate my friendship to your person, but I must be true "to the cause I serve, and where my conscience is interested all "other obligations are swallowed up. I should most gladly wait "upon you according to your desire, but that I look upon you as "engaged in that party beyond the possibility of retreat and consequently incapable of being wrought upon by any persuasions; "and now the conference could never be so close between us but "that it would take wind and receive a construction to my dishonour. That great God who is the searcher of our hearts "knows with what a sad sense I go upon this service, and with "what a perfect hatred I detest this war without an enemy. But "I look upon it as God-determined, and that is enough to silence

* *Mercurius Aulicus*.

† *Certain Informations*, No. 25.

"all passion in me. The God of peace in his good time send us the blessings of peace, and in the meantime fit us to receive it. We are both upon the stage, and must act those parts that are assigned to us in this tragedy. Let us do it in a way of honour and without personal animosities.* This attempt, by Hopton, under the plea of friendship, was probably merely to gain time; and thus, proving a failure, a message next came from Lord Hertford, desiring if any further action should occur between their forces that quarter should be given, and that they should fight no more "in holes but in champagne ground." Sir William replied, that if any of his men refused quarter they should themselves be quartered, and so dispatched the messenger, sending with him a trumpeter bearing a challenge to the Marquis to meet him for a battle that afternoon, about Sherston, in the plain; and as he knew he had no powder offering, if he pleased, to send him some.† But before the trumpeter arrived the Royalists were seen to be on the move; for being aware of Waller's activity, and hearing that reinforcements were coming from Bristol, they had determined without delay to march for Oxford, being unable to attend an enemy who had his supplies so near.‡ Waller moved also, and at once occupied Marshfield; then drawing together his countrymen newly recruited around Bath, the "most absolutely disaffected district in the county," he followed before night; his men being much iuspired at Sir Ralph Hopton's misfortune, and believing their enemy had no powder, and that "one more bout would end them."§ As soon as Waller was known to be in pursuit, the country people deserted the retreating troops, and the population generally through which they passed would give them neither meat, drink, nor intelligence. That night they camped at Chippenham, but early next morning Waller was close upon them, and after a slight encounter, when many laid down their arms and became

* Clar. MSS. 1719, Waller to Hopton.

† God in the Mount. Clar. MSS. 1738.

‡ Echard.

§ Certain Informations.

prisoners, "frighted" them from thence ; then keeping up a perpetual skirmish in their rear he drove them, now only about twelve hundred strong, into Devizes, where they shut themselves up and sent off to Oxford for immediate help. This chance of assistance could hardly have escaped the notice of so good a soldier as Sir William ; but laying siege to Devizes on Monday, and relying on the weakened condition of those within he fully and confidently expected a surrender by Wednesday ; and in this expectation, and possibly to hasten it, he offered immediately fair and liberal conditions. A poem of the time says ;

Into Bristol news there posting flies
That he (Waller) by conquest had driven to Devize,
His old comrade (Hopton). Noble General,
On whom a sudden accident did fall.
And Sir William his brag did make
In three days space that town to take,
And into Bristol as a prisoner bring
That noble knight, proved faithful to his king.*

But hindered in all his work by a continual rain day and night his hopes were not to be realised. The town held out, and on Thursday, just as arrangements were completed for an assault, fresh horse from Oxford, reported as two thousand strong, with eight waggons of ammunition, were suddenly announced to have arrived within two miles entirely unperceived.† Col. Popham, Col. Strode and others, with their weary men, went out and met them bravely on Roundway Down ; but after a gallant struggle the Parliament troopers became disordered and were then entirely defeated, routed, and dispersed. Sir William Waller escaped to Bath and so to Bristol, where he afterwards received from the House of Commons the sum of five thousand pounds, wherewith to reward his men for their courage and bravery. The king's troops following occupied Bath without resistance, and rested there a time to refresh themselves and await further orders. This

* News from the King's Bath.

† A True Relation of the late Fight between Sir W. Waller, &c.

disaster on Roundway, occurring so soon after it, was spoken of at the time as if it were a part or continuation of the battle of Lansdown. It was with Roundway defeat that Waller was afterwards taunted, the fight on Lansdown being considered a drawn one, producing only mutual prostration. The royalists acknowledged that Waller was discomfited rather than beaten.* Having certainly a great advantage in position, which he somewhat lost, he was under as great a disadvantage as to men. Strong enough in cavalry, having over forty troops, he was miserably weak in infantry ; and yet, had his rough raw country men made but one more effort, their victory would have been absolute. On the other hand, one more attack would have resulted equally in a victory for the royalists. The mere gain of the battle field, however, was of no military advantage to them as it was immediately resigned from necessity and weakness ; a weakness which increased daily, whilst Waller, by his retreat, was daily strengthened and able to fight again. It was thus that the Parliament party chose to consider and attribute their retreat as an intended disadvantage to their opponents, rather than forced upon themselves from necessity. By the pursuit to Devizes, however, the positions were exactly reversed ; as, shut in there, the driven royalists were comfortably protected, and as much nearer their base of supply as Waller was the farther from his.

This victory destroyed the power of the Parliament in the West, and placed the county of Somerset at the mercy of the king. His Majesty quickly issued a Declaration, pointing out how wonderfully God had manifested His care for him and his cause ; renewing his former promises to maintain the just privileges of the Parliament, and to govern by the known laws of the land ; and urging those who wished him well, vigorously to aid him with men, money, plate and horses, in a confident expectation that God's favours would be continued.†

Hooper Jacob.

† His Majesty's Declaration.

There being no force to oppose them the royal troopers soon over ran the whole county ; and ranging from place to place stopped every road and bye-way so that any communication within it became almost impossible.

And so affairs pretty much remained until the remarkable victories of Sir Thomas Fairfax and Cromwell in 1645-46 again altered them, and some three years later brought about the well-known end.

The Bath Waters. By CAPT. MACKAY HERIOT.

(*Read March 18th, 1874.*)

The subject of my paper is an enquiry into the composition of the different mineral springs of Bath. Before giving you the result of my researches, a few words on the antiquity of these baths may be interesting to those unacquainted with the subject.

According to Warner, the earliest known period of these baths being of any repute was the year A.D. 44, and above a century ago the remains of a Roman Bath, of considerable size, were discovered on the site now occupied by the "Roman Baths" near the Abbey. The size of this Bath was 240 feet long by 120 feet broad. The name "Aquæ Solis" (Waters of the Sun) is generally supposed to have been given by the Romans to this City.

There are many legends in connection with these Baths. Geoffrey of Monmouth tells us how Bladud the son of an ancient British King was banished from Court, on account of his leprosy ; and whilst wandering in some menial capacity through the valley of the Avon, came across these mineral waters, and bathing in them was cured of his disease.

John de Villula, Bishop of Bath and Wells, who lived in the year 1106, gave great attention to these Baths, and it is supposed that the present enclosures round the chief springs were built

under his direction. It appears that the management of these waters was in the hands of the Prior and Monks of the Monastery of Bath until the time of Henry VIII., when all the property connected with the Monastery was granted to a certain Humphrey Colles ; some fifty years later this property, including the King's Cross and Hot Baths, was given to the City of Bath.

Royalty appears to have honoured the Baths from a very early date. Warner mentions that Athelstan and Edgar made use of the Waters, and Dr. Falconer mentions in his work that a Bath seems to have been provided, from very ancient times, for the use of Royal visitors, since the name of "King's Bath" occurs as early as the beginning of the 13th century.

I notice in Mr. Earle's work that the present "Queen's Bath" took its name from the following circumstance ; Anne, the consort of James I., was bathing in the "King's Bath," when there arose from the bottom of the cistern, just by the side of her Majesty, a flame of fire like a candle which then spread itself on the surface into a large circle of light and disappeared. The Queen was frightened, and though assured by the Doctors that it proceeded only from natural causes she would bathe no more there, but went to the "People's" Bath, which has since borne her title.

I will now draw your attention to a few remarks on the original sources of mineral waters. We all know that constant evaporation goes on from all surfaces of water on the face of the earth, this vapour being condensed into rain falls, and is absorbed by the earth or ocean. That portion falling on the earth permeates through it until it reaches a less permeable strata, when, taking the downward direction of the dip, it follows its course, filling up the holes and caverns. As the water accumulates, so is it forced up through the different crevices, until it finds its way out at some lower level ; thus giving rise to the formation of Springs and Rivers, which in their turn supply the Lakes and Oceans, from whence the water vapour originates.

The question arises, how are the mineral constituents, which

compose, say, these very Bath Waters, how are they taken up by the rain water in its passage through the earth? Looking at this table of analysis, I find that there are present Calcium, Magnesium, Sodium, Potassium, Sulphuric Acid, Silicic Acid, Carbonic Acid and Chlorine, also Strontium, Lithium and Iron in small quantities. Now, we can account for Sodium, Potassium and Lithium being present, for nearly all the salts of these metals are soluble; but with regard to the Magnesium, Iron, Silicic Acid and Carbonic Acid, how are we to account for their presence? We may reasonably suppose that some of the rain water penetrates to a very great depth, owing either to crevices, or the permeable nature of the strata through which it passes. These waters would, naturally, have the same temperature as the earth around them. Calculating the downward increase of temperature at about 1° Fahr. for every 55 feet, at the depth of two and a half miles we should find a heat some 30 degrees over boiling point; and I think it is a question for consideration, whether the action of water, under high temperature and pressure on carbonaceous residue, might not account for the large quantity of Carbonic Acid gas given off by Mineral Springs. Again, another theory I submit to your notice; May not the internal heat of the earth have some decomposing action on the lower lying limestones? It is a known fact, that at a low red heat (more especially if in the presence of carbonaceous matters) Limestone will commence giving off Carbonic Acid gas.

I lay great stress on this gas question, for if we can satisfactorily account for its presence, then the case of the other metals is easily settled, as I will explain. It has been demonstrated by Chemical experiment, that many Siliceous rocks were decomposed when exposed to the action of water saturated with Carbonic Acid gas at considerable pressure; and that the substances dissolved by such water, corresponded with the various contents of many mineral springs. It is also a known fact that water vapour at high temperature will dissolve Silica. The source of the Nitrogen

in the water can hardly be considered from a chemical, and I may also say from a geological point of view, such a question of importance as the Carbonic Acid gas. Nitrogen plays no part in breaking up, or decomposing minerals to a soluble form like the former gas ; it is a most inert element, it is not combustible, neither will it aid combustion. I am informed that Doctors impute great virtue to this free Nitrogen ; however, while the atmosphere is composed of four-fifths of it, I may be wrong, but I do not see the necessity of going to the Baths for it. As to the source from whence it comes, some are inclined to believe that it is carried into the earth by the rain water, while others say it is given off by decomposed Nitrogenous matter.

But, to get to the practical portion of my subject. As far as I can learn, there are four Mineral Springs supplying the following Baths ;

- 1st. The Roman Bath :
- 2nd. The Hetling do :
- 3rd. The Cross do :
- 4th. The King's do :

These springs though probably from the same source in the earth are not connected by artificial means.

The water for analysis was taken from the nearest accessible source to the spring, with the exception of that from the " King's Bath," which was taken from the drinking fountain in the large Pump Room ; and for this reason, so many persons came there to drink of the waters, that I thought it of more consequence to let them know what they were drinking, than that the bathers should know in what they were bathing. Not that there would be much difference in the result of the analysis, the waters of the large bathing place where the spring is, would naturally be stronger in earthy constituents and iron, from the fact of there being more free Carbonic Acid gas in them ; the water in passing thence by pipes to the fountain would probably lose a portion of this acid, then down goes the iron, lime and magnesia, and that

accounts for the red ochreish deposit we notice on the drinking fountain.

The amount of iron in the water at the drinking fountain King's Bath is not by any means constant ; it varies as much as 20 or 25 per cent., and at times, no doubt, very much more.

A pipe from the source of the spring communicates with the drinking fountain ; and the engine which pumps the water up this pipe also fills the Tank which you will notice in rear of the Baths. Now, when the engine is not at work, the fountain is supplied from this Tank ; and the consequence follows that the water being exposed loses its carbonic acid gas, which causes a proportionate quantity of the iron to be deposited, and will account for the variation noticed. On the other hand, when the supply comes direct from the spring, a change in the taste of the water will be remarked, and the greater amount of iron may then be clearly detected.

In the analysis of the Cross Baths you will observe the relatively large amount of Calcium and Sulphuric Acid, and the small amount of iron, as compared with that of the King's and Roman Baths. I particularly draw your attention to the Iron in the Cross Bath. Now we should naturally expect to find a proportionately larger amount ; I confess it puzzled me at first when working out the analysis, but a few minutes reflection showed the reason of it. The nearest accessible source to the spring at this Bath was the bathing place itself, the grating over the spring being soldered into the stone work, there was no help for it but to take the water from the bathing place when first refilled after cleaning out. The Cross Bath is emptied on Sunday morning, and it takes till the following morning to refill it, so that when the water for analysis was collected at 7 a.m. on the Monday, it had been exposed for many hours ; and consequently, all the excess of carbonic acid gas, which had probably held in solution some twenty-five per cent of the Iron had gone off, leaving that metal deposited. I will explain to you what I mean by the excess of this gas. Water will contain a

certain amount of it, and that amount depends upon the temperature and pressure brought to bear on it; thus the mineral waters here, if collected at the source of the Spring, may then contain as much as thirty cubic inches per gallon, but if exposed to the air for some time, it will possibly contain only about half that quantity, and the difference is the excess to which I refer. Many of the Bath people have an idea that their Mineral waters are without change, and as this point had never before been noticed it occurred to me that a few experiments to prove how far this was the case might be interesting. No doubt some present may be aware with what extreme accuracy Chlorine may be determined, and I have taken advantage of this to give you some idea of the daily variation of these waters. I estimated the amount of Chlorine contained in each Spring, day by day, for the week ending February 21st; the tabular statement which I now lay before you will show it.

Bath Mineral Waters, 1874.

Table showing the daily variation of Chlorine in the Waters for the week ending February 21st (expressed in parts per million).

	Feb. 16.	Feb. 17.	Feb. 18.	Feb. 19.	Feb. 20.	Feb. 21.
Hetling	278	279	277	278	278	278
King's	277	280	278	284	277	280
Roman	264	270	264	266	266	270

	parts per million
Greatest amount of Chlorine found was in the } King's Bath }	284
Smallest amount found was in Roman Baths .	264
Greatest Variation—Hetling	2
„ „ King's	7
„ „ Roman	6

You will observe the lowest figure shown is 264 for the Roman Baths on the 16th February, while the highest is 284 for the King's Bath on the 19th February, giving a variation of 20 parts per million. The King's and Roman Baths, taken independently,

show a variation of seven parts, whilst the Hetling Pump water was the most constant, giving only two parts per million.

The Cross Baths are not noticed in this table, as the only get-at-able source was daily contaminated by people bathing there ; but its figure for Chlorine is comparatively high, being 280, and this was determined on the only opportunity I had of getting at the water in a state of purity.

You will readily perceive from the result of the analysis which I have laid before you, that the waters of the different springs undoubtedly come from the same source in the earth. We may justly suppose that the spring travels in an easterly direction, from the fact that the waters give their greatest strength at the Hetling and Cross Baths, while at the other two Baths they appear to lose somewhat of their solid contents. It may possibly be argued that the reverse is the case ; but it must be remembered that at the Hetling Pump we get the greatest heat, at the same time the water shows a greater amount of Calcium and Sulphuric Acid. This, of course, is simply my opinion formed from my own observations ; the geological formation of the strata through which the spring passes would have everything to do with its solid contents, but that is a point I am not prepared to enter into at the present time, still I should be very glad to hear the opinion of some of the members of this Club on the subject.

We may deduce three facts from these analyses ; 1st, that the waters from the Hetling and Cross Baths are stronger in their mineral constituents than those of the Roman and King's Baths. 2ndly, that these waters show a daily variation, which, though not large, may yet be distinctly recognised, a point not noticed by other analytical chemists. 3rdly, that the mineral water from the chief drinking source in this town does not contain the amount of iron which it might, and which the original water holds in solution. I refer to the fountain in the Grand Pump Room.

In conclusion I must thank Dr. Falconer for his kindness in procuring me access to the waters of the King's Bath.

ANALYSIS OF THE BATH MINERAL WATERS, FEBRUARY, 1874.

Constituent Parts.	ROMAN BATHS.		KING'S BATHS.		HETTLING PUMP.		CROSS BATHS.	
	Parts per Million.	Grains per Gallon.	Parts per Million.	Grains per Gallon.	Parts per Million.	Grains per Gallon.	Parts per Million.	Grains per Gallon.
Calcium	Ca.	367	377	26.39	401	28.07	388	27.16
Magnesium	Mg.	43.8	47.4	3.31	62.2	3.65	46.8	3.27
Potassium	K.	37	39.5	2.76	31	2.17	37.5	2.62
Sodium	Na.	125	129	9.03	137	9.59	140	9.80
Lithium	Li.	.67	Traces.	Traces.	Traces.	Traces.	Traces.	Traces.
Iron	Fe.	5.9	6.1	.427	6.7	.469	4.5	.315
Sulphuric Acid	S. O ₄	840	869	60.83	884	61.88	895	62.65
Carbonic Acid }								
(combined) }	C. O ₂	87	86	6.02	89	6.23	83.5	5.84
Chlorine	Cl.	262	280	19.60	275	19.25	280	19.60
Silica	Si. O ₂	29	30	2.10	36	2.52	38	2.66
Strontium	Sr.	Traces.	Traces.	Traces.	Traces.	Traces.	Traces.	Traces.
Alkaline Sulphides		Traces.	Traces.	Traces.	Traces.	Traces.	Traces.	Traces.
Carbonic Acid Gas		Cubic centimetres.	Cubic centimetres.	Cubic inches.	Cubic centimetres.	Cubic inches.	Cubic centimetres.	Cubic inches.
at normal temperature & pressure	C. O ₂	65.3	62.2	18.2	80.4	23.4	51.5	14.9
Solid Residue		1920	1920	134.4	1950	136.5	136.5	137.9
Temperature at Source where water was taken }		39½ Centg.-103° Fahr.	41½ Centg.-106½° Fahr.		46 Centg.-115° Fahr.		41 Centg.-105° Fahr.	
Specific gravity	...	1.0015	1.0015		1.0020		1.0020	

The Water for Analysis was taken from the nearest accessible source to the spring, except that from the King's Bath, which was taken from the drinking fountain in the Grand Pump Room.

MACKAY HERIOT, *Captain Royal Marine Light Infantry*

The Mineral Spring at Batheaston. By Capt. MACKAY HERIOT.

(Read February 17th, 1875.)

As far as I can learn, the analysis of this spring has never been published before or brought to the notice of any scientific Society ; and I believe the first complete analysis of it was that made by me in March of last year. Tracing the course of this spring and showing its connection with the Bath Mineral Waters may be of some interest to the members of this Club. Leaving the King's Bath and travelling east through Grosvenor we pass within a few hundred yards of the once celebrated Bladud Spa, about a quarter of a century since so renowned for the medicinal qualities of its mineral water. Continuing our walk eastward we arrive at Batheaston, a village on the right bank of the river Avon, some two miles from Bath, from which the spring in question takes its name.

The Batheaston Mineral Water rises through an old deserted mine shaft, now covered up, and passes by an underground passage about 500 yards when it emerges at the bottom of the hill on the grounds of C. E. Broome, Esq., discharging itself into the brook, at the rate of some 300 gallons per hour. The water when collected was perfectly bright, clear and colourless, and had a faint alkaline reaction, which I afterwards discovered to be due to the enormously large amount of free ammonia in it. The temperature observed at the time of collection was 59° Fahrt., while that of the brook into which it flowed was only 52° Fahrt.

When reading my paper last year on the Bath Waters, I purposely omitted to bring to your notice the different processes gone through in determining the amount, &c., of the several constituents, my reason for this omission was to avoid matters of detail of little interest to my hearers. I have often remarked when looking over the analysis of mineral waters made many years ago, that no mention was made of the mode in which the work was investigated ; a glimpse into the treatment of the

residues would have given one some idea what credit to give it, for chemistry like other sciences has much advanced of late years, and the method of working out an estimation of CO^2 or Fe some 30 years ago would hardly be considered a correct process at the present time.

For the reasons just mentioned I shall submit to your notice the circumstances under which the different determinations in this analysis were arrived at.

A Qualitative Analysis having been first made, a Quantitative was proceeded with in much about the following order :—

1st. For the Solid Residue :—A Platinum basin was cleaned, heated to redness, allowed to cool, and weighed ; 100 C.C. of the water poured into it and evaporated to dryness on a water bath ; then transferred to an air bath and kept at a temperature of 130° Centigrade for a few minutes ; taken out, allowed to cool and weighed, the difference between this weighing and the former one = 311 Milligrams, or 3110 parts per million.

For the Silica :—A litre of the water was placed in a large porcelain basin, and Hydrochloric acid in excess added and digested at a gentle heat with constant stirring until the residue was dry ; again moistened with Hydrochloric Acid, warmed, diluted, the residue washed on the filter, dried, and finally ignited, the result giving 13 Milligrams, or the same number of parts per million. I should mention that this residue was examined by the spectroscope for Barium, which was found to be absent.

For the Sulphuric Acid :—The turbidity produced on the addition of Chloride of Barium being very great, only a $\frac{1}{4}$ of a litre was taken for this determination ; some Hydrochloric Acid added, then heated to boiling, and Chloride of Barium added, washed by decantation with hot water, collected on a filter, and the washing continued as long as the filtrate gave a precipitate with Sulphuric Acid, then dried and ignited, the residue weighed as Sulphate of Barium, and the amount of Sulphuric Acid estimated therefrom.

For the Chlorine :—100 C.C. of the water had a few drops of the Yellow Chromate of Potash added to it, and was then titrated with a standard solution of Nitrate of Silver, and the Chlorine calculated accordingly.

The Iron was determined gravimetrically as follows ; $1\frac{1}{2}$ litre of the water was evaporated to a small bulk with Nitric Acid, the Iron then thrown down with Ammonia as Ferric oxide, dissolved on the filter with Hydrochloric Acid and again precipitated with Ammonia, washed, dried, and ignited ; the residue being weighed as Ferric oxide, giving 1.5 parts per million.

The iron was also estimated volumetrically with standard solution of Permanganate of Potash, and gave similar results. I may here add that a qualitative analysis showed the absence of Alumina and Phosphoric Acid.

The combined Carbonic Acid :—The water for this purpose was collected in a separate bottle in which a certain quantity of standard solution of Baryta water and Chloride of Ammonia had previously been placed. It was afterwards digested in hot water, and an aliquot portion of the clear liquid titrated with the standard nitric acid ; thus the amount of free CO_2 was found.

The precipitate left in the bottle was then collected and titrated with the standard acid, by which the total amount combined and free was calculated. The difference between the two calculations showed that due as combined only.

The Nitric Acid :—This little figure, .35 parts per million, gave more trouble than all the rest of the analysis put together. Everything used in the determination had to be chemically pure and the apparatus chemically clean. The process adopted was that recommended by Wanklyn and Chapman. 100 cubic centimetres of the water were distilled with pure Caustic Soda to drive off the free Ammonia. When cool, small pieces of Aluminium were added to the solution which was set aside for a few hours in order that the Nitrates might become decomposed, when it was again distilled, and the Ammonia formed by the decomposition

of the Nitrates collected and estimated by Nessler Solution, and the Nitric Acid calculated accordingly.

The Ammonia, 1.04 parts per million, was found by distilling $\frac{1}{2}$ a litre of the water with a little pure Carbonate of Soda and then determining the amount with Nessler Solution. I should add that the waters gave a yellow precipitate simply on the addition of the before-mentioned Solution.

For the determination of the Alkaline earths, half the filtrate from the Ferric oxide was taken, Chloride of Ammonia having been added to keep the Magnesium in Solution. The Calcium was thrown down with oxalate of Ammonia, ignited till all the carbonic acid was driven off and weighed as lime. Afterwards, when examined with the spectroscope, the characteristic lines of Strontium were observed. The Magnesium was then precipitated with Phosphate of Soda in excess, allowed to stand 12 hours, and filtered, after careful washing was dried and ignited; the residue being weighed as Pyro-phosphate of Magnesium, and the amount of Magnesium calculated accordingly.

The Potassium and Sodium :—For this purpose $\frac{1}{2}$ a litre of the water was taken. The Magnesium and Calcium separated with pure Hydrate of Lime and Oxalate of Ammonia, the usual precautions being taken and the Potassium estimated with Pt. Cl^4 . (Chloride of Platinum) as recommended by Fresenius, the Sodium afterwards determined by difference. The residue was here examined spectroscopically, when the beautiful red line of Lithium shone out at once.

The foregoing is an outline of the Laboratory operations. With regard to the estimation of the Iron, Silica, Alkaline earth and Alkalies I have followed the system of Fresenius; for the Nitric Acid, Ammonia and solid residue, Professors Wanklyn and Chapman are my authority; while for the volumetric processes I have adhered to the plan laid down in Mr. Sutton's work.

Here is a paper showing the analysis of the mineral water we are discussing and that of the King's Bath. I have placed them

in two columns side by side for the convenience of comparison. At a first glance of the two sets of figures their appears little similarity between them. The solid Residue of the one is nearly double that of the other, while the Chlorine and Sodium is nearly four times as much. To compare these waters we should first make some enquiries into the Geological formation of the Strata through which the Spring passes.

Analysis of the Batheaston Mineral Water, made in March, 1874, by

Capt. MACKAY HERIOT.

The analysis of the King's Bath made about the same time is annexed for the convenience of comparison :—

Constituent Parts.	Batheaston Water. King's Bath.	
	Parts per	Million.
Calcium	261	377
Magnesium	65	47
Strontium	traces	traces
Sodium	476	129
Potassium	28	39
Lithium	traces	traces
Iron	1.5	6.1
Chlorine	964	280
Sulphuric Acid	958	869
Silicic Acid	13	30
Carbonic Acid (combined)	82	86
Nitric Acid ... ..	.35	traces
Ammonia (Free)	1.04	none
Solid Residue	3110	1920
Specific Gravity	1.0026	1.0015

I am no geologist, so that I cannot inform you from my own observations on the subject, but my friends Messrs. Moore and Ekin tell me that the Spring most probably passes through the

new red marl, a formation known to be rich in Alkaline Chlorides. This being the case we have a fair starting point for the comparison.

The Chlorine and Sodium show the greatest difference, that for the Batheaston water being 964 and 476. For the King's Bath 280 and 129 respectively.

There is one peculiarity about these figures which I must call your attention to, which is that they increase in the same ratio. Observe that the Chlorine of the King's Bath is a little more than double the sodium there ; in the other water the same ratio will be noticed, viz., 476 to 964. I think there is a fair amount of evidence to presume that the large excess of Alkaline Chlorides is gained by the mineral water in passing through the red marl ; the other constituent parts can be shown to have a remarkably intimate connection with those of the King's Bath and may be compared thus (I will run them down in the order as they occur on the paper) Calcium, King's Bath 377, Batheaston water 261 ; here is a difference of 30 per cent., likely to be owing to lime thrown down through loss of Carbonic Acid given up in the underground passage from the old mine to the brook where the water was collected. In Magnesium there is a gain of 20 per cent., probably taken up in the red marl. Strontium, slight traces apparent in both waters. The Sodium we have accounted for. Potassium 28 in the one, 39 in the other ; showing a close resemblance. Of Lithium, there are traces in both waters. Iron, this metal is much smaller in amount, but as in both it exists as carbonate, the small quantity 1·5 parts per million is probably due to loss of Carbonic Acid as in the case of the Lime. The Chlorine has been referred to. Sulphuric Acid much about the same 958 parts to 869 parts in the King's Bath. Silicic Acid, though showing a larger difference, in both the amount is small. The combined Carbonic Acid, 82 to 86, we may call these figures nearly similar. Lastly, the solid Residue, the large excess of Alkaline Chlorides will account for the difference found here.

And now I come to the Free Ammonia and Nitric Acid present in these waters. Looking at the analysis of the King's Bath, mere traces of Nitric Acid were found and no Ammonia. Now here in the Batheaston water is a small but noticeable amount of the former and a remarkably large amount of the latter. I don't give much heed to the nitrates but the quantity of Ammonia is a matter for consideration. Is it a *bond fide* portion of the mineral constituents of the water, or is it due to sewage or decomposed animal refuse filtered through the earth?

Should it be due to the former, it is I say a notable feature in the Batheaston Spring, for few mineral waters are thus favoured.

Studies and Problems for Somersetshire Geologists.

(Communicated by H. B. WOODWARD, F.G.S., Feb. 17th, 1875.)

Notwithstanding the advantages which Somersetshire possesses over other counties of England in the interest attaching to its Geology (so many different formations being represented), there are yet comparatively few residents in the county who have devoted themselves to the task of unravelling the geological history of their immediate neighbourhood.

It might be imagined that the labours of Buckland and Conybeare, of De la Beche, Lonsdale, Sanders and Moore, had left very little for others to do; and when it is known that upwards of five hundred books and papers, referring in some way or other to the Geology of Somersetshire have been published, one might feel a certain amount of reticence in adding to the literature of topics that would seem to have been pretty well exhausted.

Having endeavoured during the past few years to glean from the numerous published works to which I have been able to gain access, the *facts* in Somersetshire Geology; and having thereby, as in all other studies, in a certain sense increased my ignorance by finding

how much there is yet to be learnt, I have thought it might be interesting to the Members of the Bath Natural History and Antiquarian Field Club, if I were to point out to the best of my ability some of the more interesting points in the Geology of Somersetshire that have not yet been thoroughly examined, and some of the many theoretical questions that have yet to be solved.

In bringing forward these remarks, it is not that I imagine any want of energy on the part of the local Natural History Societies and Field Clubs (the work done by them is so well-known and appreciated, that it would only sound presumptuous on my part to say anything in praise of it) but when one looks to the actual workers, they will not be found to be very widely diffused over the county. Excluding Clifton and Bristol, which of course send several workers into the field, the actual resident geologists in Somersetshire, or at any rate those who have published their researches, seem to be confined to Mr. Charles Moore and the Rev. H. H. Winwood, of Bath, and Mr. McMurtie of Radstock; not forgetting, however, Mr. W. A. Sanford, who (in conjunction with Mr. Boyd Dawkins) has so largely added to our knowledge of the Post-Pliocene Mammalia of the county; nor Mr. G. S. Poole, of Brent Knoll, who has thrown so much light upon the history of the alluvial and estuarine deposits of the Moor-lands.

Frome, Wells, Shepton Mallet, Axbridge, Bridgwater, Taunton, Chard, Ilminster, Yeovil, Crewkerne, Wincanton, and many other towns and large villages, seem to be destitute of geologists. Any effort therefore to stimulate more local activity and interest in geological subjects, may I trust not be undeserving of consideration.

Old Red Sandstone.—The palæontology of this formation is but little known, and although essentially a barren deposit, yet it is possible that patience would be rewarded by the discovery of some forms of life, besides the few obscure plant remains that have been recorded. The discovery of animal remains would gain more importance from the fact that the Mendip Old Red

Sandstone is the nearest deposit of that age, to the Devonian rocks of West Somerset, and although similarity of organic remains does not in itself prove contemporaneity in strata removed from one another, yet the parallelism of successive faunæ is a subject of the highest interest.

Devonian Rocks.—The record of all fossils from the Devonian rocks of West Somerset is important. The Rev. H. H. Winwood has recorded some observations on the palæontology of the Quantock Hills, but much has yet to be done.

Carboniferous Rocks.—There is plenty of work to be done in collecting and tabulating the fossils of the Mountain Limestone of the Mendip Hills; in doing for this rock what Mr. Stoddart has done for the Mountain Limestone of Bristol.

Oolitic Rocks. The palæontology of the Inferior Oolite (Dundry excepted), of the Fuller's Earth, Great Oolite, Forest Marble and Bradford Clay, of the Cornbrash and Oxford Clay, is but little known. A census of the forms of life met with in these rocks is very much wanted. Still less is known of the fossils of the Coral Rag and Kimeridge Clay developed in the south-eastern portion of Somersetshire.

Cretaceous Rocks.—Since the days of Dr. Fitton but little if anything has been published on the Chalk and Greensand of Long Knowl and Kilminster, which are within the boundary of Somersetshire. A comparison of the rocks and fossils of this district with those of Chard would be of much interest; particularly taken in connection with Mr. Meyer's recent comparisons between the Warminster beds and those of Beer and Black Down.

No records, so far as I am aware, have been published of the occurrence of Upper Lias in the escarpment between Doultong and Cadbury Castle, south of Castle Cary. Further south (although only in places represented upon the Geological Survey Map), its persistence as a stratum between the Midford Sands and Middle Lias is fully warranted by the researches of Mr. Moore.

Are all the beds marked on the Geological Survey Map as Kimeridge Clay, at Longleat Park, Witham Park, &c., really Kimeridge Clay? Fossil evidence would no doubt decide these points, which are not very certain according to some notes furnished to me by Mr. W. T. Aveline; the Gault may be in part at any rate represented at these localities.

Among other interesting questions to which answers are yet wanted are the following :—(1) Whether the fan-shaped structure exhibited in the Mountain Limestone on the high road west of Dolberry Camp, be an actual inversion, or merely a sharp synclinal; (2) What is the relation that the several patches of Mountain Limestone represented on the Geological Survey Map (sheet 35) as occurring in the midst of the Coal-measures of Clapton-in-Gordano, bear to the rocks surrounding them; and whether the explanation of their position may help to explain the apparently similar masses of Mountain Limestone at Vobster and Luckington; (3) To what cause does the Harptree Chert owe its origin, was it due to the action of heated water during some igneous eruption, or was the metamorphism (for such it certainly is) produced by the former presence of some hot-springs like those at Bath? (4) What is the exact relation of the Igneous rocks, discovered near Stoke Lane by Mr. Moore, to the Old Red Sandstone? (5) Are there any certain evidences of the Glacial Period in Somersetshire; any travelled boulders?

Researches upon Lithology, principally those carried on within the last ten years, show how important an aid is the microscope in the true identification of the Eruptive rocks. It is now-a-days rash to identify in any but a general way such rocks in the field; to give to them names consistent with their true mineral composition can only be done with accuracy from an examination of thin slices from the rocks under the microscope. Here is a wide field of study! Somersetshire, it is true, compared with many other English counties, can boast of but few exposures of Igneous rock. Those in the Mendip country are pretty well known, and my

friend Mr. F. Rutley, F.G.S., has examined specimens from near Wrington, Weston-super-Mare, and Stoke Lane; his observations will shortly be published. The syenitic dyke near Hestercombe and the volcanic ash at Adscombe near Nether Stowey, would lead to the supposition that other exposures of igneous rock in West Somerset will be determined, when that part of the county has been thoroughly explored.

Moreover microscopic examination might very well be brought to bear upon the method of formation of many of the stratified rocks.

In Mineralogy it would be interesting to learn something more about the occurrence of Mendipite, and also of the Lead-and-Zinc-ores in the Mendip Hills. The formation of Potato-stones too is a puzzle not yet explained.

Apart from the solution of the questions just recorded, some of which would require extended researches, there yet remains constant work for the local geologist in examining and noting all sections exposed in the neighbourhood; work which can only as a rule be done by one resident near the spots, because there are so many sections opened but for a short time; such are the foundations of buildings, excavations for drainage, and many pits and quarries which are opened for a limited time. Railway-sections too require to be looked after when first made, for most of the cuttings soon become more or less obscured. The accounts of well-sections and trial pits are always of great importance, and are sometimes only retained in the memory of the sinker. Moreover, the organic remains, unless looked after, are generally neglected by the workmen.

It is the recording of local facts, however trivial they may seem in themselves, that is the most valuable, although perhaps least appreciated, branch of geological inquiry. Upon the collection of such facts depends the grand deductions of the science.

I may be pardoned, perhaps, if I allude briefly to the work of the Geological Survey, whose object is to map out the superficial

extent of the different rocks, and to explain the structure of our country by the publication of memoirs and sections; but the work is very far from being exhaustive.

Professor Edward Forbes once remarked to the effect, that when the geological survey of a country had been completed then the time had arrived for the working out and true understanding of the geology to *begin*. It would not be becoming on my part further to refer to the works of the Survey, than to state that they may generally be taken to furnish a sort of index of what is known of the geology, and as a guide to more detailed research. From their very nature they must leave in a great measure untold any account of the physical and natural history of the by-gone times, of which the rocks are the records. It has been remarked that the members of the Geological Survey, as a rule, overlook the importance of palæontology, but it must be remembered that from the very nature of his work the Surveyor cannot linger by the way to collect fossils, while the effects of a hard day's work in the field are to render very close application in the evening rather the exception than the rule.

For my own part I recall with pleasure the many hours spent in rambling over the hills and vales of Somersetshire, and it has been with feelings of great regret that I have left many an interesting and picturesque locality with little expectation of returning again, unless indeed the future publication of the Ordnance 6in. maps be attended with a call for a new geological survey of the county. Perhaps the future researches of Somersetshire geologists may render this the more necessary.

*Summary of Proceedings of the Bath Natural History and Antiquarian
Field Club for the year 1874-5.*

MR. CHAIRMAN AND GENTLEMEN,

It has hitherto been our custom on the 18th of February to terminate the year's proceedings with a dinner, to commemorate the foundation of our Club on that day, now twenty years ago. So few members (four or five only) responded to the usual notice that it was thought necessary to abandon the anniversary dinner this year. Whether on account of the inveterate superstition that clings to an Englishman's mind on the subject, or from a feeling of respect to the Vice-President, an *impromptu* dinner was organised at the York House, and Mr. Scarth read an address on the progress of Archæology which he had prepared for the anniversary (*vide* p 135). The usual conversazione which concluded the evening meetings for 1873-4, was held on 18th March. The attendance was good and Captain Mackay Heriot was the first to lead off with a paper containing the results of his inquiry into the composition of the Bath Mineral Waters; and very important these results were. (*Vide* p. 163). Many interesting facts were brought out in the discussion that ensued between Dr. Hunter, Messrs. Ekin, Robert Biggs, Moore and others, respecting the origin of the gases and minerals contained in the waters; and also regarding their source, whether it was to be looked for at no great distance below the surface, or whether it was deep seated and connected with some old volcanic vent. The Rev. Prebendary Scarth, who presided, having conveyed the thanks of the meeting to Captain Heriot for the important communication he had made, Mr. Robert Biggs then illustrated the manners and customs of the Upper Ten Thousand in Bath at the close of the 18th century by giving an account of a little episode which occurred on Combe Down; the deliberate murder in duel of Viscount du Barri by a Count de Rice; or as it was called, "A Tragical Adventure of the Viscount

du Barri," (*vide* p. 121), causing no little flutter among the then *habitués* at this fashionable Spa. The Secretary concluded the evening with a description of a walk along the new line of railway between Bath and Evercreech as far as Midford, describing the points of geological interest on the way. A portion of a molar tooth of *Elephas primigenius* presented to the Institution by John Smith, an intelligent "ganger" on the line, and other mammalian bones, together with fossils from the "Midford Sands" and other sections described were exhibited; and an admirable section of the whole line made by Horace B. Woodward, of the Geological Survey, was suspended in the room.

The Winter Session of 1874 opened with an Address by Dr. HUNTER; the principal subject of which was the life and character of Elizabeth Chudleigh, the famous Duchess of Kingston. Dr. Hunter considered the lady the most remarkable person in the line of proprietors of the Abbey-estate since the Dissolution, and he thought that at the end of a century the time had now come when her story might take its place in Bath history without scandal or prejudice. It seemed impossible to relieve her Grace of the imputation of insincerity during the duke's long courtship; and this, Dr. Hunter thought, was the worst part of her story. The sources from which information about the duchess may be gained are easy of access. The members of the Club who like to search old magazines and other similar stores for anecdotes of the brilliant adventuress will gain a vivid impression of life in the eighteenth century, the era of Bath's modish influence and splendour.

The Rev. Prebendary EARLE, who presided, and other gentlemen made a few remarks on the time and places in question.

The second evening meeting of the session was set apart for geological papers, and took place on Wednesday, December the 9th, under the presidency of Dr. Hunter. Mr. MCMURTRIE commenced with a very important paper "on certain Isolated areas of Mountain Limestone at Vobster and Luckington." The

paper was illustrated with some admirable diagrams, for which all the papers he reads to the club are so noted, and from several important facts which he brought forward for the first time, was calculated to unravel certain problems of complicated geology in the Mendip district, (*to be printed in the next number of the Club's proceedings.*)

A discussion ensued, in which Messrs. Charles Moore, Ekin, Tawney and Winwood took part, and was closed with a vote of thanks to the lecturer.

This paper was followed by one from the SECRETARY on a Rhœtic and Lower Lias section near the Old Down Inn on the Bath and Evercreech line. The object of this paper was to follow up the geological thread dropped last session, and record in the annals of the Bath Field Club some of the more important "passage bed" sections that occur in that interesting tract of country (*to be printed in the next number of the Club's proceedings.*)

The VICE-PRESIDENT contributed a paper on the evening of Jan. 15th, on the physical features and historical connections of the Mendip range, under the title of "Gleanings in the Mendip and its Vallies," of which the following is an abstract :—

The paper began by describing the Geological and Geographical features of the Mendip Hills, and afterwards passed on to consider the remains of an ancient Celtic population which had inhabited that region. The barrows circles and hollows were duly mentioned, and references given to more full details in the "Journal of the Archæological Institute." The Roman road, which, passing into Somerset near Maiden Bradley in Wilts, and continuing along the crest of the Mendip, ends at the promontory of Brean Down, was next considered ; the camps which lie along the line of the road, and which for the most part command passes through the hills, were carefully described. Some appear as præ-Roman, and others undoubtedly Roman. Also the roads passing through the defiles ; one coming from Portishead and Portbury, and branching off towards Bridgewater, and the Polden Hills. Next the Roman remains found at Charterhouse, the Camp and Amphitheatre, the Pigs, and Laminæ, or bands of lead, bearing the Imperial stamp of Rome dating from the time of the Emperors Claudius and Vespasian to that of the Antonines ; the coins also reaching from Mark Antony to Probus and Tetricus. The

remains of Roman Villas near Wrington and Yatton, the numerous Caverns in the Mendip Hills and their contents were noticed, and references given to fuller accounts. Four were stated to have been discovered in Burrington Combe alone, viz., Aveline's hole, Whitcombe's hole, Plumley's den, and Goathurst cavern, in two of these traces of man were found. A recent fissure, Mr. Scarth said, had been discovered near Aveline's hole, and apparently connected with it; but in attempting to explore it, a labourer had lost his life, by unskilful management, and the extent and termination of the fissure had consequently not been accurately ascertained.

The paper noticed the existence of Roman Potters'-kilns discovered near Shepton Mallet, and recorded in the proceedings of the Somersetshire Archæological Society; and fixed the date of the construction of the Roman road to within the first century of the Christian Era.

The Saxon remains were then considered, and the notices of Cheddar contained in the Codex Diplomaticus and other authorities, and the story of the escape of King Edmund from being carried over the Cheddar Cliffs while hunting. Also the notices of ancient Saxon Monasteries which existed at Banwell, and probably also at Congresbury. Of the two monasteries given by Alfred the Great to his favourite Asser, who afterwards became Bishop of Exeter, the one it was stated was Banwell, and the other probably Congresbury; as the reading of one of the ancient MSS. of the "*Annales Rerum Gestarum Alfredi Magni*" gives *Cungresbury* instead of Amgresbury (another reading), supposed to be Amesbury in Wilts. Mr. Scarth thought it more probable that Banwell and Congresbury were held together, as they are within a reasonable distance of four miles. No Saxon remains, he said, have been found at either of these places, but these have probably been used in the foundations of the present churches, which have been rebuilt in Mediæval times, and are both handsome and interesting structures. But Saxon remains have been found at Rowberrow, where the Tower of the Church is probably Saxon, and Saxon remains exist at Chew Stoke, built into the Churchyard boundary wall. The influence of the great Saxon Monastery of Glastonbury extended through the Mendip district, and if careful search were made, Saxon remains would probably still be found in many places. The paper touched upon the subject of the Mendip Mining Laws, and also upon the remains of a refugee population traceable here and there, and concluded with an allusion to the beauty of the Mediæval churches in the district of Mendip.

Dr. HUNTER in expressing the gratification the meeting felt in hearing Mr. Scarth's communication, called attention to the fact

of a junction of two Roman roads at Congresbury which gave some support to the tradition of its having been the seat of a bishop, or at least contributed a negative to the argument against the tradition on the ground of the inaccessibility of the place.

A description of the Battle of Lansdown followed (*vide* p. 145.) Mr. Green, the author of this and several other useful papers of local and historical interest, (for which the Club is much indebted to him,) was enabled by his access to the Clarendon MSS. to give a more detailed, and in some respects more correct version of this battle than existed previously. The principal point of the subsequent discussion turned upon the age and origin of the numerous pits near the site of the battle; and the general opinion seemed to be that, made prior to the battle of 1643 for purposes of quarrying tile-stone, they had been most probably made use of by the combatants on the occasion.

Dr. Hunter in the chair, the Rev. Preb. EARLE, on Feb. 17th, gave the result of his etymological researches in an address to the Club on "Local Names." As Mr. Earle's remarks cannot be given in full in the body of our Proceedings an uncorrected abstract only is presented.

Local names, he said, greatly interest us by the enigmatical aspect which they now present. Strange as they now seem, they were once descriptive of the face of the country as it appeared to men of a thousand years ago. They are of different ages, and had their birth among people who spoke different languages, and may be classed chronologically in the order in which the land was occupied by different races. The natural features of the country, the hills and the streams, retain in the main the names given them by the British inhabitants, the political divisions are still known by the names given by their English founders. The very common river name Avon was at first merely a word signifying river, and numerous names such as Axe, Exe, Ouse, Usk, Isca, are but forms of one and the same Celtic word meaning water. The name Yeo is probably the same as Gwy, the Welsh word which we call Wye. The ignorance of succeeding people has often added a word of similar import to the British original. We hear of the river Avon, and on its opposite bank of the Dolemeads; then again we have Windermere lake, Pen hill, Wookey hole, the British word Ogo

requiring now the addition of cave or hole to explain it ; these may be called tautological words or words that express the same meaning in British Welsh and Saxon language.

The British names have often suffered mutilation through attempts of the fanciful to give a sort of meaning in English to sounds, the real import of which was lost, and Roman names have suffered by the same process. The fundamental particles *chester*, *street*, *way* and others have not so suffered, but where there was anything exceptional, the process is almost constant. The Roman name of Bath was *Aquæ* ; and in Gaul *Aquæ*, under the forms of *Aix* and *Dax*, still remains, but here the effort to give an English meaning changed *Aquæ* into *Akemannesceaster*. Mr. Earle, however, thought that the syllable 'man' was the British 'maen' a place, and rejected the translation, Sickman's city. The city of Bath was one of the rare instances of a place changing its name. She emerges from oblivion in the seventh century with the name Bath. One other town in England which has changed its name is Chester, formerly *Deva* ; we know that this town was for a long time after the Roman period desolate and deserted by its inhabitants. May we not seek for the reason of our city changing its name in a similar cause. From the sixth to the end of the ninth century was the period when the whole local nomenclature was settling down into our present forms. We have the usual Wicks, Tons, Buryes and Fords. Of the two fords Saltford and Freshford, Mr. Earle did not consider the names antithetical, or as having any relation the one to the other so as to support the opinion that the salt water formerly came as far as Saltford, but rather that the particle *salt* was a remnant of *salicetum*, and was the ford among the willows ; and he found in Freshford an allusion to the rapid course of the stream in that neighbourhood, as *fresh*, in the sense of sweet water, was not an ancient use of that word. Claverton was a good instance of both the common particles Ford and Ton, together with the more specific word Clot. Claverton may be found in Kemble's 'Codex Diplomaticus' as Clatfordton ; and Clât or Clot is the name not yet extinct for a water lily, thus we have the pretty name Town at the ford of the water lily ; in illustration of this Mr. Earle quoted the following lines from Barnes, the Dorset poet :—

' Where wide and slow
The stream did flow,
And flags did grow,
And lightly flee
Below the grey-leaved willow tree ;
Whilst clack, clack, clack, from hour to hour,
Did go the mill by Cloty Stour.'

The various Saxon words used as particles in the local nomenclature of England are not of the same date; and in many instances the later have been added at the end of a word compounded of the earlier. This may be called stratification of names, to use a geological term. It is for a chronological reason that *Wick* is never found after *Ham*; though there are many Wickhams, and though there are Hamptons and even Wickhampton, *Ton* is always the last. Yet the words have much the same meaning, and are evidences of races speaking different dialects, having successively occupied the pieces of land or buildings thus described. This rule must not however be applied to words or names of Latin or French origin; in these compound adjectives are often used, and they may, according to their intended force, be placed before or after the noun. After the Conquest many names of places received as additions the personal names of the new lords. The list is copiously supplied from all counties. Wootton-Bassett, Sutton-Courtney, Burgh-Walter (now known as Bridgwater), are examples. Of modern names there are very few likely to endure, they are usually fanciful and affected and no longer descriptive. They show that the work of naming is completed in England. Some through accidental circumstances are worth remembering; Boscobel received its Italian name in the Renaissance time, and was descriptive; our Belmonts and Belvideres of a century ago were meant to express in a romantic tongue the beauty of their situation. Englishmen had then begun to travel; these names may be called peregrinatory names.

The business of the evening did not allow time for the usual discussion. Mr. Moore, however, from the result of recent excavations, especially of those carried out on the site of the old White Hart, corroborated Mr. Earle's view of the total desertion of Bath; in every instance he had remarked that the foundations of the Roman walls had been covered by a deposit, which indicated that a tranquil body of water had existed there for a considerable period. The Chairman, in thanking Mr. Earle for his terse and instructive communication, suggested the antithetic relation between our two fords as the ford of Firs and the ford of Willows; and then called on Captain Heriot to give the result of his analysis of the Batheaston Mineral Waters, which rise from a deep seated source in Mr. Broome's field. (*Vide* p 171.) The excess of free ammonia present gave rise to some conversation

and Mr. Ekin undertook to test fresh samples, to discover whether it was due to a temporary cause. The third paper, read by the Secretary, was written by Horace B. Woodward, F.G.S., who, as one of H.M.'s. Geological Survey, had jotted down some "Studies and Problems for Somersetshire Geologists;" these, as being well worthy of record, are printed in full (*Vide* p. 177). A vote of thanks to Mr. Woodward for his suggestions brought the evening to a conclusion.

Though there has been no falling off in numbers this session, yet the attendance of members at these meetings is not very encouraging to the authors of papers. Ladies and visitors, however, continue to show an interest in our subjects, and their presence is welcomed.

EXCURSIONS.

The first Excursion of the season to Nempnett, Burrington and Sandford took place on April 21st. The day was perfect for the time of year, and the members (23 in number), after reaching Bristol by an early train, proceeded by 'break' to Nempnett, where they were met by the rector of the parish, the Rev. Samuel Trueman, and by the Rev. Prebendary Scarth, their Vice-President. Under the guidance of the rector they entered the church, which has been restored in very good taste, and ornamented by a stained east window, &c. ; after inspecting the Font of Perpendicular date ornamented with shields charged with the device of heads rising out of handled jugs, or perhaps lilies from lily pots, they proceeded to the Parsonage where they were most hospitably received. Very fine ale and an old Register divided the attention of the antiquaries. The latter contained the following entry ;

'The regester booke of Nempnet of marege Christenings and burials, 1568. In the keepinge of this booke there hath been greate negligencie.' And 'This booke written the 40 yere of the Raigne of our Queene Elizabeth 1599.'

The first entry is in 1568, the last in 1661.

'On the Tenth Day of October 1655 was an earthquake & windd in divers places, with a great noise, somewhat resembling the sound of thunder.'

'On the eighteenth day of february 1661 happened a most vehement tempestuous wind which blew down some of the lead of this church, uncovered many roofs, & threw down many trees.'

The cover of a silver chalice had on it the date 1451.

After pausing a short time to refresh themselves and examine the noble view both up and down the Vale of Wrington, embracing thirteen churches from Lansdown on the east to Weston-super-Mare on the west, the members proceeded into the valley to the village of Ubley, by a footpath through the meadows. The church here, though a fine structure of different dates, is in the worst possible state of repair. Some of the ancient wood open seats remain but the interior is disfigured by unsightly pews, such as were common half a century ago ; indeed nothing seems to have been done to this church for more than that period, and it will need considerable outlay to make it fit for Divine service. The old wooden desk for the church books, to which they were attached by chains, still remains in the south aisle, but the books themselves appear to be in a very forlorn condition. From Ubley the party passed on to Blagdon, where they paused to inspect the handsome church tower ; but did not enter the body of the church, a modern structure which exhibits a violation of every rule of Ecclesiastical architecture ! The old church was removed some years since and the present oblong edifice substituted. Proceeding along the beautiful road through Rickford Combe past the residence of Mrs. Valpy, the party were conducted up the side of the Mendip to the top of Burrington Ham, so as to overlook the camps which crown the entrance to the narrow pass called Burrington Combe. Here they halted to enjoy the lovely prospect of the vale below, and to trace the course of the Severn and the distant Welsh hills beyond. Immediately at the foot of the eminence on which they were seated was the pretty church and parsonage of Burrington, and beyond this Langford Court with

its park and precincts, and the woods of Mendip lodge filling up the foreground on the left hand. Here Mr. Scarth gave a short description of the places of note within sight, the associations connected with them and the ancient line of Roman road which passed through the Mendip mining country from Brean Down all the way to Old Sarum, and thence to Clausentum, or Bittern, thus connecting the Severn with the Southampton Water. Along this road the mineral traffic is supposed to have been carried in Roman times. The line of other Roman roads still traceable were pointed out; as *e.g.*, that which seems to have passed from the great camp called Dolebury, not more than a mile and a half from Burrington camp, to Cadbury camp, near Clevedon, thence to Tickenham, and on to Portbury where are also remains of Roman earth-works. Having inspected the traces of ancient mining still visible in the hills the party passed on to the Vicarage, where they were most kindly received by the vicar, the Rev. W. B. de Moleyns; and from thence past Langford Court to the Inn at Langford where dinner had been provided. Afterwards a brief account was given of the latest discoveries of Roman remains in the mining district of the Mendip, and the thanks of the club were conveyed to the two gentlemen who had so kindly guided and refreshed the excursionists. The 'breaks' were then ordered and the party returned to Bristol by way of Wrington, where they paused to see the beautiful church and examine the lych-gate, lately erected at the eastern entrance of the churchyard, the plan and details of which were highly approved. Bath was reached at half-past nine after a very successful excursion.

Clevedon and Walton Castle.—The second Excursion was on June 2nd, when fourteen members with three visitors proceeded by rail to Clevedon, where they were met by the Rev. G. Weare Braikenridge, and at once started in various vehicles for Cadbury Camp. Passing on the way Clevedon Court, a pretty glimpse of which was caught through the fine trees and shrubs which surround

it, the hill on the left leading to the Camp was 'breasted,' and the serious work of the day commenced. It was found necessary to call a halt now and then, if only to expatiate on the fine view, or some point of natural history, *e.g.*, that the white water lily grew down below at Tickenham, &c. The difficulties of the steep ascent being at last conquered, Mr. Scarth soon collected his listeners on the breezy rampart of the Camp, launched at once into his favourite topics, the Roman camps, roads, and coins; described the various positions of the former, the lines of the roads, and the 'finds' of the latter, incidentally stating that though no Roman coins had been found actually inside the one on which they were then standing, but only near it, yet that he considered it to be Roman notwithstanding its round shape. Proceeding thence along the E. side to the entrance on the N.E., whence a fine view of Kingroad was obtained, Mr. Scarth alluded to that ancient boundary, the Wansdyke, which either terminated at Clifton Down or was carried still further westwards to Portishead. Leaving the Camp at the N.W. side, an old road bounded on either hand by circular depressions, supposed to be hut circles, was followed. Unfortunately a rather high wall crossed the line of progress; a slight impediment only to the more active of the party, but presenting a very great difficulty to one or two of the members; generous aid, however, was readily afforded and the wall finally scaled. An easy descent after crossing the last outwork of the hill past a warm hollow on the right, favourite haunt of butterflies, and a shady lane received the members already feeling the heat of the midsummer sun. Just before emerging into the road at the bottom an agreeable surprise awaited them in the shape of a lunch provided by the forethought and hospitality of Mr. Braikenridge. After a pleasant rest in the shade, the Secretary read the following notes on the Geology of Clevedon:—

We are now, Gentlemen, standing on the extreme S.W. limit of the Great Gloucestershire and Somersetshire Coal field, or to speak more

correctly on the edge of the small Nailsea Coal basin, which forms the S.W. portion of that larger Coal field. From time to time during our excursions I have attempted to lay before our members the main features of this Coal field extending in a triangular form from Cromhall as its apex, to the range of the Mendip Hills as its base (whose probable total area is 240 square miles, whose exposed area is 48 square miles), and I venture to say if you have been able to master the varied formations contained within this district, you have made yourselves masters of some of the most knotty points in Geology, and will be able to form a very fair notion of the whole coal area of England. We will, however, to-day confine our remarks to some of the features of the Nailsea basin. The origin of these basins I have before attempted to describe. Well, this Mountain or Carboniferous limestone forming the sides of the basin and resting conformably on the Old Red sandstone, may be traced nearly the whole way from Tortworth on the N., to Almonsbury, Westbury-on-Trym and Durdham Down. Here the Avon gorge cuts through it and forms the division between Durdham and Leigh downs. From the latter down it extends westwards by Cadbury camp to Clevedon, where it meets another ridge of the same formation which runs along the coast from Portishead by Walton down; at this point of meeting they probably form one continuous ridge, which runs on beneath the Channel by Woodspring point to the Steep and Flat Holmes, whilst Backwell and Broadfield ridge continues beneath the alluvial plain to Worle hill. The Mendip range likewise running on beneath the Channel from Brean down to the Steep Holmes. The general dip being N. and S., the principal mass of Limestone (or its strike) therefore runs E. and W. From this brief general description you will see that the shape of the district is that of a trough or basin, bounded on all sides by the Carboniferous limestone. The range of downs we are now standing on forming one side, Broadfield down the other, the Mendips and Brean down the third. I said that the Carboniferous limestone rests conformably upon the Old Red sandstone, and this is the case in a general way throughout the district, save where here and there a fault brings some other formation in juxtaposition, as we see near 'Naish House,' about a mile to the E. of Cadbury camp. Here the Coal measures themselves are brought down against the Carboniferous limestone by a downthrow of the Old Red sandstone. During our morning's walk we passed, if you remember, over the Pennant sandstones, a part of the Coal Measures, in a quarry on the slope N. of the Down. The Coal Measures take the proper position of the Old Red from this point to Clevedon, a distance of five miles. This fault runs parallel with

the axis of the down all the way, and 'tilts the Coal Measures at a high angle where they approach it, and dislocates them. I believe no actual workable coal has been discovered in this valley, though there seems to be no doubt that the coal belongs to the Lower series (like that in the Nailsea basin), as the Pennant appears to rest on the coal at Clapton church. In the Nailsea basin the second rate character of the coal has caused the workings to be neglected for some years. The old shafts seem to have been sunk much too close to the S. edge of the basin, and must consequently have struck a very disturbed region, though if a trial was made more in the centre, perhaps greater success would have attended it.

Clapton in Gordano Borings.

	Fect.
Soil and New Red sandst :	10
Dolom. Congl :	21
Pennant	135
Bed of Marl with water	136
Pennant	156
Clay	
Coal 10 in.	162
Shales	222
Pennant	442
Shale	447
Pennant	510

(The coal fields of Glouster and Somerset, by John Anstie, C.E.)

Dolomitic or Magnesian Conglomerate; fringing the sides of this basin and even occurring here and there as patches on the top of some of the hills, e.g., near Walton Castle, a very peculiar formation is seen. If you handle a good specimen you will find it composed of a mass of rounded and sub-angular pebbles composed of Old Red sandstone, Millstone grit, Mountain limestone and Quartz, cemented by a yellow matrix of carbonate of lime and magnesia. This Conglomerate graduates from large boulders of considerable size, as much as three tons in weight, through small rounded pebbles to a fine grained buff-coloured freestone or Magnesian limestone which is used for building, and forms the quoins of most of the pretty villas in this neighbourhood. Well, then, what is this peculiar conglomerate? First, however, as to its position, I said it fringes the sides of the hills throughout the basin; it not only does this but is found resting in a peculiar manner on the 'basset' or upturned edges of the Carboniferous limestone or old Red sandstone; these edges, too, if you look closely at them, have been planed down by some mighty

agent preparatory to this deposit. It also fill^d up the inequalities on the Palæozoic rocks, and is found in patches or 'pockets' in several places. So far for its position.

To what date may we assign this deposit? Though much has been written since the time of De La Beche respecting this old water beach, yet I do not think much new information has been added to what that eminent Geologist has already given to us. (I may except the discoveries of Messrs. Riley and Stuchbury of two genera of reptilia, *Thecodontosaurus* and *Palæosaurus*, on Durdham Down.

Within certain limits, however, we may give the date. These limits may be on the one side the age of the Carboniferous limestone, on the other the period of the Liassic formation. So that we allow a good lengthy period for this formation, you will see. From the nature of its composition and from its position we come to the conclusion that it was the old sea or water beach of the Palæozoic period, and may draw this picture to our mind's eye:—First, the deposition of the Carboniferous limestone in a deep sea, teeming with animal life. Then a gradual shallowing of the waters when the more sandy formation of the Millstone grit was deposited. Then a still further shallowing of the bottom of the sea until it became dry land and admitted of the wonderful growth of vegetation as exhibited during the Coal measure formation, with various oscillations of level and final submergence to allow of the formation of the Pennant sandstone; another elevation when the Upper Coal Measures were deposited. And then some great and mighty disturbance (not to be traced to the trap dyke on Mendip as the cause), but one of those great crumplings which corrugated the Old Red and succeeding formations upwards as far as the Coal Measures in mighty anticlinal and synclinal folds, leaving the surface weak and a ready prey to the incursions of the breakers which acted upon these exposed folds and contortions like a huge plane; the softer coal-beds on the anticlinal folds easily disappearing before its irresistible action; the harder beds below, such as the Pennant, Millstone grit, Mountain limestone, and Old Red sandstone being not so easily disposed of, but leaving their traces in those boulders and pebbles, and forming the beds of Conglomerate which you trace throughout the district. Then followed a period of repose, which allowed of these waters to wash the *débris* of the old shore into shingle; and a still longer period during which the waters charged with carbonate of lime and magnesia gradually consolidated these beach-like accumulations; a process now going on throughout our coast line. If you ask whence came the materials, I ask you to look towards the Mendips, and with an effort of the imagina-

tion (and it requires a very strong one) pile up some 6,000 feet of strata on their top (*vide* Professor Ramsay); and then with another effort which must be even a still stronger one, look at that enormous mass being gradually eaten away by the waters, and you may then have some idea of the vastness of the time and of the agencies required, wherewith the God of Nature has worked His will upon those everlasting hills!

Mr. Braikenridge then gave the result of his researches amongst the Flora of the district in the following list of plants found by himself. The *Ophioglossum Vulgatum* was rare and only found in one field.

Polypodium vulgare.
Lastrea thelypteris.
 „ *oreopteris.*
 „ *filix-mas.*
 „ *dilatata.*
Athyrium filix-femina.
Asplenium adiantum nigrum.
 „ *trichomanes.*
 „ *marinum.*
 „ *ruta-muraria.*
Scolopendrium vulgare.
Ceterach officinarum.
Blechnum boreale.
Pteris aquilina.
Osmunda regalis.
Ophioglossum vulgatum.
Orchis morio
 „ *mascula.*
 „ *ustulata.*
 „ *maculata.*
 „ *latifolia.*
 „ *pyramidalis.*
Gymnadenia conopsea.
Habenaria bifolia.
Ophrys apifera.
Spiranthes autumnalis.
Listera ovata.
Neotteea nidus-avis.
Epipactis latifolia.

Crossing the alluvial valley on which Walton-in-Gordano is situated and ascending the steep slope of Carboniferous limestone on the opposite side, the members diverged to see a large boulder of Conglomerate resting in a field on the side of the hill. A slightly raised circular bank on the level plateau of Weston down pointed out to the Club by Mr. Braikenridge, was considered by Mr. Scarth to be a Roman Circus. Walton Castle at the W. end of Walton down was the next point visited. The arms of the Pouletts *i.e.* three swords in pile, said to be over the entrance gateway, were sought for in vain; and as the members passed through the deserted octagonal courtyard and admired the fine views of the Channel and opposite coast caught through the ruined windows of the flanking towers, they thought how easily this once aristocratic hunting box might be restored to habitable uses. The Secretary, of course, did not permit the members to leave the hill without pointing out to them the patch of Conglomerate resting upon the upturned edges of the Carboniferous limestone to the S. of the Castle, 315 feet above the sea level; and leading the way through Walton farm and across the interesting Old Red sandstone ridge conducted them along the Palaeozoic beach of the period, here assuming a fine grained Magnesian limestone appearance to a remarkable little cove in the rocks, where the Conglomerate, very coarse at the base containing large blocks of Limestone, Old Red sandstone, and Quartz pebbles, was seen lying unconformably on the 'basset' edges of the Old Red which dipped sharply into the hill. A slight detour to Lady's Cove to see the fault which brings the Conglomerate in fine grained masses to the sea level, and soon the Rock Hotel was reached, where the somewhat weary pedestrians were refreshed by a good dinner, and returned to Bath by an evening train.

Excursion to Woodspring Priory, &c.—This excursion, which had been originally fixed for July 7th, was postponed at the previous Quarterly meeting until 22nd of that month. Nine members only, with a visitor Colonel Drummond Hay, took part in it.

The somewhat monotonous flat between the Worle Station and the Priory was traversed in a conveyance which had been sent from Weston-super-Mare to meet the 10.23 a.m. train ; and nothing of any interest occurred on the way, save an occasional halt made to allow the botanists of the party to examine the marsh group of plants by the road-side. Arrived at the Farm house, the members proceeded to view the remains of the Priory consisting of a Conventual church, Refectory and Barn. The Tower, a fine specimen of perpendicular work, was mounted, and the Secretary took this opportunity, whilst the members were recovering from the exhaustion of their ascent, to read a few notes which he had put together respecting the early foundation and subsequent history of the Priory, the best account of which is to be found in the Som. Arch. and Nat. Hist. Soc. Proceedings for 1853. After payment of the usual visitors' tax a traverse across the fields on the N.W. brought the members to a sheltered little cove, with its whitened beach of rolled limestone pebbles. The object of this detour was to inspect the trap rock which traverses the Limestone in various directions. The hammers of the geologists having been set to work, and specimens obtained, the Secretary took up the thread of his remarks on the Geology of the Nailsea Coal basin, and pointed out that this Carboniferous limestone, dipping away at a high angle to the S. and S.E., was probably a continuation of the N.W. boundary of that basin on which they stood on their last excursion to Clevedon. On a former occasion they had seen an exposure of trap on Broadfield down ; they had now seen another below them. The question of the age of the igneous outburst was then discussed, and the Secretary thought that from the altered appearance of the Limestone in immediate contact with the trap, some, if not all of the beds had been deposited previously to its intrusion. A pleasant and breezy walk on the down led them next along Swallow cliff to Sand point. Owing to the recent drought and great heat the grass was much burnt up and very

slippery rendering the search after plants rather difficult. Only two or three returned to the conveyance, the rest preferred to walk along Sand bay and joined the others at the Lodge gate on the Kewstoke road. A very indifferent dinner at the Pier Hotel terminated the day, and a stroll afterwards to the "raised beach" near Birnbeck Cove, in the midst of a grateful shower, served to illustrate the few notes that the Secretary gave after dinner on "raised beaches" in general, in connection with the oscillation in the level of the land on our Devonshire and Somersetshire coasts. The following list of plants gathered during the day was furnished the Secretary by the botanists, and are worthy of record :—

Statice spatulata (Lloyd). (Sea lavender.)
Convolvulus soldanella (L).
**Marrubium vulgare* (L). (White horehound.)
Crithmum maritimum. (Samphire.)
Orobanche minor (occidentalis). (Broom rape.)
Trifolium arvense
Galium verum. (Bedstraw.)
Armeria maritima. (Sea pink.)

* Apparently wild in a station far removed from houses.

Mr. Braikenridge stated that he had during a botanical excursion in this vicinity 23 years ago found *Rosa spinosissima*, *Ranunculus passiflorus* and *Lycopsis arvensis*.

Wookey Cavern and Ebbor Rocks.—The excursions were brought to a close on Tuesday, Oct. 6th, by a visit to Wookey Cavern and the Ebbor Rocks. Though the weather was by no means promising, yet the botanists and geologists were well represented, and a fair muster (13 in all) started by the 9.53 train for Bristol and the Cheddar Valley. Landed punctually at their destination, the members walked from the Wookey station through a picturesque ravine to the celebrated cavern ; here they were met by Mr. Hodgkinson, jun., and under his guidance threaded the intricacies of the interior. Some fears were expressed that the more advanced in age of the party would have

to bend their backs too much, or even have to crawl on their hands and knees during their progress onwards; these fears, however, were soon set at rest, for with one or two trifling exceptions, an upright position could be maintained throughout, and thus the roof and sides be well examined. The general plan of the interior is that of three chambers, called respectively in the guide book nomenclature the "witches' kitchen, parlour and drawing-room" (two of these being of considerable height, some sixty or eighty feet), connected together by winding passages of various levels. A sharp descent led to the first, and here an unexpected surprise was prepared. Mr. Hodgkinson was seen by the aid of the glimmering candles to disappear into the far-off darkness, and suddenly the whole of the vast interior was lit up by a lurid glare, bringing out every crevice and stalactite covered prominence in full relief; the operator himself of this transformation scene standing out in full profile against the dark pool which welled out at the bottom. At each successive chamber this was repeated with various coloured lights and added immensely to the weird effect. The third and last chamber was reached by the aid of planks, and thus the source of the river Axe was traced up, as far as the members could do so, to a quiet pool of water imperceptibly stealing forth from the farthest end and finding its ultimate starting-point in the numerous "swallet" holes which abound on the hill tops overhead. An adventurous cave explorer has, however, penetrated much farther, in the person of Mr. Parker, jun., of Oxford, who, lying on his back on a raft, worked his way upwards so far as the space between the water and the roof permitted. Having returned to daylight, the Secretary detained the members for a short time whilst he gave an account of the recent cave researches in the hyæna-den on the opposite side of the ravine. Standing some twenty feet above the hole whence the stream flowed which gives birth to the river Axe,

He drew attention to the confusion that often existed as to which was the cavern and which the celebrated hyæna-den. The members had just

visited the cavern, which had been long known and was the scene of many a legend since the Roman period. That it was known to the Romans might be inferred from the statement that a 'pig' of Roman lead had been found in the antrum, (a fact, by-the-by, of which he, the Secretary, should like to obtain good evidence of its credibility). So far as any remains were concerned, the cavern had only contributed some pottery and a few bones of no remarkable interest. But, on the other hand, the hyæna-den on the opposite side had only recently been discovered and was of much more importance. Some workmen of Mr. Hodgkinson, whilst cutting a canal to convey the water to his paper mills below, had, about the year 1850, accidentally broken into the entrance of the den. And it was due to the cave-hunting propensities of his friend, Mr. Bayd Dawkins, that this remarkable den, with its large assemblage of bones of the extinct mammalia, associated with the evidence of man's handiwork in chert and flint weapons, had been made known to the public in the *Journal of the Geological Society* for 1862. Having described the position of the bones and the flint implements, how the former, from their gnawed appearance and other indications, must have been introduced into the cave by the hyæna, and had probably remained there undisturbed by the hand of man until the present day, he gave a slight sketch of the configuration of the country when the horse and the rhinoceros roamed on the plain below, and herds of Cervidæ frequented the wooded slopes; and after that period the great changes which had taken place before the den assumed its present appearance, and had sealed up within it those evidences of a life that had now passed away.

After these remarks the members proceeded to inspect the den, and found several pieces of bone from the *débris* left by the former explorers. Having thanked Mr. Hodgkinson for his kindness, they walked thence to the Ebbor rocks, and ascended the Lion rock; whence a magnificent view is obtainable, somewhat spoilt, however, by the usual mist which seems to love the neighbouring city of Wells; looked at the shallow "scrooping" for hæmatite iron ore in the Lower Limestone shales, and waded through the wet grass up a picturesque wooded hollow, until a heap of *débris* from an old coal sinking attracted their attention. Hammers were plied, and revealed the fact that the sandstone blocks on the "tip" were Millstone grit; a rather remarkable fact in the puzzling geology of these interesting hills, indicating great disturbance and an

extensive fault, as the high ground on either hand of this hollow consists of older rocks, *i.e.*, the Mountain limestone, which, when in its normal position, comes below these grit beds. A rapid walk onwards, and a refreshing cup of tea and delicious fruit at Draycot vicarage was a pleasant close to an instructive day.

Maesbury.—Amongst the by-excursions and walks during the past year there are two which are worthy of record, one was to the Camp on Maesbury, on 15th Sept. The train was taken on the Bath and Evercreech line to Binegar; thence on foot past fern-clad walls to a fine exposure of Limestone shales in a cutting under Maesbury. Many good specimens of Mountain limestone fossils were obtained well weathered out from the shales, several *Pentremites*, &c. Unfortunately there was no good exposure of the junction of the Old Red sandstone and Mountain limestone shales as might have been expected. Striking over the Camp a cross country traverse was made to Shepton Mallet; just before reaching the town, a very fine section of altered Lias has recently been made, whence several characteristic Sutton stone fossils were obtained for the geological bags and the return home was effected without mishap.

Mr. Broome has kindly sent the Secretary the following notes :—

Batheaston, 16th September, 1874.

The only flowering plant I saw at all uncommon was the wormwood, *Artemisia absinthium*, in a quarry near Binegar. Some ferns were in greater abundance than is usual, and a good hint might be taken to render old shady walls useful adjuncts to the scenery from one near the above place, the summit of which was clothed with a mass of *Asplenium trichomanes* some inches thick, and hanging over the edge in a very graceful manner, interspersed with fronds of *Polypodium vulgare* which tended to show off its more diminutive neighbour to great advantage. This extended a distance of many yards. *Ceterachia officinalis* was also very abundant on other walls. This, perhaps our prettiest British fern, seems to prefer a south aspect, at least it grows there equally well as on a northern exposure, which may be a useful hint for those who wish to clothe walls or rocks in that position. *Cistopteris fragilis* occurred also on the walls and old banks. A few fungi were noticed

but not in the quantities that might have been expected from the warm rains we have lately had. *Boletus edulis* (Bull) occurred on Maesbury camp in fine condition. *Boletus elegans* (Schum) in the same place; where was also *Cantharellus aurantiacus* (Fr), and *Calocera viscosa* (Fr) on fir stumps, and *Polyporus destructor* (Fr) on stumps in a fir plantation near Binegar. These constitute the greater part of the fungi noticed.

Tuesday, Nov. 24.—The members on their return from Englishcombe to Bath passed through Twerton, and arrived just after the Twerton Colliery Company had been rewarded in their efforts to find coal; a little black heap of that valuable treasure having just been brought to light that very morning. The total depth of the new shaft was at that time 120 yards and the miners had passed through thick beds of Lower Lias clays and limestones, about eight feet of White Lias and the usual red beds or New Red marl overlying the coal.

Such is the summary of the Club's collective proceedings during the past year. Whether the members have individually done their best to carry out the object of the Club, the investigation of the Natural History, Geology and Antiquities of the neighbourhood, must be left to their individual consciences to determine. That one member, whose genial presence and happy repartee so cheering in the long walk but now to be seen and heard no more, will be very much missed, is a fact we all must acknowledge and sincerely regret.

H. H. WINWOOD,
Hon. Sec.

Results of Meteorological Observations made at the Bath Royal Literary and Scientific Institution, during ten years commencing with March 1865, and ending with February, 1875. By the REV. LEONARD BLOMEFIELD, M.A., F.L.S., F.G.S., &c., President.

(Read November 11th, 1875.)

When the British Association met at Bath in September, 1864, I made some remarks to the Physical Section on "The Temperature and Rainfall of Bath."* Bath being a place so much resorted to by the public, especially by invalids, not merely for the sake of its medicinal waters, but from its affording a comparatively mild place of residence in winter, I considered that the climate of Bath was likely to be a subject of general interest. I could not however on that occasion bring forward much that was based upon my own observations, not having been a resident in the neighbourhood for many years, nor always resident in the same locality. I was obliged, therefore, in great measure to make use of the observations of others. These were chiefly supplied to me by Mr. Biggs, late Pharmaceutical Chemist, in Charles Street in this town, who had kept a meteorological register for twenty years, commencing with November, 1841, and ending with December, 1861, the observations having apparently been made with great care and regularity. Looking, however, more closely into particulars and comparing the observations with some others, of which I shall have occasion to speak further on, I had reason to believe that they were not altogether trustworthy, especially those on temperature, from the construction of the instruments employed and the mode of fixing them, and that at least the results obtained needed confirmation from other sources.

Indeed it appeared to me that the whole subject of the climate of Bath required to be reconsidered, advantage being taken of the

* See Report of Brit. Assoc., 1864 (Sects.) p. 17; also *Bath Chronicle* Report of that Meeting, p. 108.

progress Meteorology had made of late years, and of the very superior instruments constructed at the present day compared with those used formerly. I was further impressed with the belief that observations of this kind could seldom be conducted with that regularity and precision which is indispensable for arriving at results of any value in a scientific point of view, or continued for a sufficiently long term of years in order to get exact averages, except at a public Institution. Accordingly I was induced to bring the subject under the notice of the Committee of the Bath Literary Institution in November, 1854, in the hope that they would take it up at my suggestion; and the proposition after full consideration being approved of, it was determined by that Committee that meteorological observations should be made thenceforth by the Librarian of the Institution, and a daily Register commenced so soon as the necessary arrangements should be completed. These arrangements consisted in the construction of a small observatory to be erected in the Institution Gardens after choosing a situation as far removed from adjacent buildings as circumstances allowed, and in the purchase of the best instruments that could be procured.

Before explaining the nature of this construction, and describing the position and fixing of the instruments, I will briefly state so much as I have been able to find in books on the subject of the Bath climate, written previous to the commencement of the observations at the Literary Institution.

This does not amount to very much. Several of the older writers on the Bath waters describe the situation of the city, and the general features of the country immediately about Bath, but scarce at all touch upon its climate. The only books known to me in which the climate of Bath is treated of in any detail, and with strict reference to its meteorology, are those of Dr. Granville*

* Hand-book to the Hot Springs of Bath, 1841. Spas of England, 2 vols. 1841.

and Dr. Tunstall.† There is however a "Sketch of the Topography and climate of Bath" in the Bath and Bristol Magazine‡ in 1834, several years earlier than the two works above mentioned. In this paper, to which only initials are attached, there is, first, a description given of the town, the river, and the springs by which it is supplied, the geology and scenery of the neighbourhood, after which the character of the climate is deduced from the results of a register of the rain and temperature kept for fifteen years, the exact years, however, not being stated. The rainfall is set at 35.30 inc., very much above the average for the last ten years, as determined by the measurements at the Literary Institution, though it would be hazardous to consider the amount as necessarily incorrect for the particular term of years to which it relates: more however need not be said on this point at present. The number of rainy days, or those on which rain or snow falls, is estimated at 162. It is thought by the writer of this paper that Bath does not deserve "the stigma of humidity so generally appended to it,"—evidently judging of its humidity by the rainfall alone.

The mean temperature of Bath, deduced from "the mean of the daily extremes as furnished by a register thermometer, placed in a north aspect, and about fifteen feet from the ground," is said to be 51°.1, which is about half a degree more than the mean obtained at the Literary Institution, and this mean may likewise be correct, or nearly so, for the years it refers to; though the great difference in the height at which the thermometer is fixed in the two cases must be taken into account. The mean temperature of each month is also given,—it being in some months not very dissimilar to the Institution mean, but in other months showing a considerable difference; it is hardly necessary, however, to repeat these here in detail. The above observations are said to have been "made on the eastern side of the city."

† Treatise on the Bath Waters, 1850. Climate of Bath, 1854.

‡ Vol. iii., p. 289.

The meteorological details in the works of Dr. Granville and Dr. Tunstall have the disadvantage of being based in both instances upon the observations of Mr. Biggs, which I have already spoken of as in my judgment not thoroughly trustworthy. I shall make, therefore, no further allusion to them at present. Still there are other particulars connected with the subject of the Bath climate in each of these works of much interest, to some of which I shall refer hereafter. That there is need for further inquiry into its true character, may be gathered from Dr. Granville's own remarks on the very contradictory terms in which the Bath climate has been described. He writes—"Some say that it is cold, others that it is temperate: there are those who insist upon its perfect dryness, while many contend that its prevailing dampness from frequent rain is notorious: lastly, we hear often of its variableness and exposure to strong winds; and nearly as often this statement has been contradicted."*

I now return to the subject of the meteorological registers kept at the Literary Institution, first speaking of the structure erected in the Gardens to contain the instruments, as well as stating what is necessary to be said respecting the instruments themselves.

Here, however, I need only copy what was printed in the "Annual Report of the Committee of the Bath Literary Institution" for the year 1865 (p. 16) when the observations commenced. The Report itself being scarcely known to any but members of the Institution, a mere reference to it would be insufficient. For the benefit of the public at large, who take any interest in the Bath climate,—it will be expedient to repeat exactly what is therein described.

"A wooden structure of hexagonal form, three feet in diameter and seven and a-half feet in height, was erected in an exposed part of the Gardens of the Institution, for the reception of the instruments, in March last. The sides of this building to within three feet of the ground, as well as the roof, are

* Hot Springs of Bath, p. 135, &c.

composed of louver-boards, like Venetian shutters, by which is insured a free circulation of air through it, while the direct influence of the sun upon the interior is excluded. Below the louver-boards the sides are simply covered with iron network—a precaution necessary to prevent interference with the instruments. Within the building is a framework to which the thermometers are fixed, likewise closed at the top and on three sides, but open to the North (where the door of the building is), with a space of fifteen inches between the back and the outer casing, affording still further security against the influence of the heating power of the sun's rays."

"The thermometers, which are so placed as to have their bulbs about four feet from the ground, consist of two self-registering ones, for day and night respectively, and a dry-and wet-bulb. They were made by Negretti and Zambra, and compared by Mr. Glaisher with standards at the Greenwich Observatory before being sent. The necessary corrections for instrumental error are applied each time the observations are made. In addition to the thermometers is a Rain Gauge,—fixed at the top of the building, at the height of eight feet from the ground,—consisting of a copper funnel, the mouth six inches in diameter, with a vessel beneath capable of holding a gallon or more, to the bottom of which is attached a stop-cock, by means of which the rain is drawn off and measured in a graduated cylindrical glass jar: of these glasses there are two, one divided into hundredths of an inch, the other of less diameter into thousandths for small quantities of rain." The estimated height of the Rain Gauge, above the sea, is seventy-five feet.

The observations are registered every day at 9 a.m. local time. The maximum and minimum temperatures entered in the register are the highest and lowest that have occurred during the previous 24 hours. The quantity of rain entered is the amount fallen during the same interval.

The Registration of the Thermometers and Rain-gauge commenced on March 1st, 1865,—but that of the wet-and dry-bulb not till the 14th June following ;—and the remarks that I shall have to make in this paper principally relate to the results obtained by these instruments during ten years dating from the day above-mentioned. A shorter period than ten years would have been insufficient for the deduction of averages that could be at all relied upon ;—while a much longer term of years I conceive is yet wanted to make the averages thoroughly correct,—especially

the average yearly rainfall, from its great variation in different years, if not in different decades of years, as I shall have further to speak of, when I come to that part of the subject.

The geology of the Bath district and the configuration of the ground in the immediate neighbourhood of the city—matters of importance in estimating the climate of any place—need not be dwelt upon here as they have been so often spoken of by others. The course of the river, and the circuit of hills by which Bath is nearly surrounded, being open only to the west, are well known to all who have ever visited it. And without question both the river and the hills have much influence upon its climate. Mr. Lowe has remarked “that near Nottingham there is a greater range of temperature than in any other part of England,” and he considers the “distance from high hills” as one of the chief reasons of the “increased heat” in summer “in that neighbourhood.” If this be so, which there is no reason to doubt, the Bath hills may well be supposed to have a contrary effect in moderating both the heat of summer and the cold of winter. The interchange of heat constantly kept up by radiation between the slopes of the hills and the town, would tend to check the cold arising from full exposure to the sky, on clear frosty nights, as well as check the heat of a bright midday summer’s sun, such as would occur in the two cases respectively if the town were situated on an open plain.

On the other hand these same hills must also have the effect of checking a free circulation of the air; and the town lying as it were at the bottom of a basin, the atmosphere—at least in the lower parts of the town—necessarily becomes, in still sultry weather, close and oppressive, causing the lassitude which is so often felt in Bath in the summer season. But to this subject I shall have occasion to return further on.

The Bath climate, or the tract of country over which it extends, would seem to commence, coming from London, on the Bath side of the Box-tunnel on the line of the Great Western Railway. Of this I had, some years back, a remarkable illustration. On

occasion of taking the train from Oxford to Bath during some severe weather in the month of November, snow began to fall immediately on quitting the Oxford station, and the fall kept increasing the whole way to Box. On entering the tunnel it was still falling thick, and the ground was quite covered ; but on the train emerging from the tunnel at the other end, it was found to be raining instead of snowing and the fields were green. At Bath no snow fell all that day.

I now pass to the results obtained from the meteorological observations made at the Bath Literary Institution since March, 1865. Those that are generally first treated of in a paper of this kind relating to climate are the Barometric observations ; but I regret that there is very little to say on this part of our subject on the present occasion, the Barometer in the reading-room of the Institution, the only one used in the daily registers previous to the commencement of the present year (1875), being a very old one made by Cary many years ago, and not admitting of the corrections necessary to be attended to at the present day in order to render the observations of any scientific worth. At the same time I am glad to think that there is now a much better instrument, a Fortin's Barometer made by Casella, to take the place of the old one, observations with which were commenced on 1st January last, so that after another decade of years we may hope to see this deficiency in the present results supplied.

Nevertheless I may make one or two statements with regard to these results such as they are. The mean height of the Barometer for ten years from March 1st, 1865, as determined by the old instrument, and corrected to sea level, is 29.944 inc. The greatest observed height during the ten years was 30.777 inc., on December 15th, 1865. The lowest observed height was 28.400 inc., on January 20th, 1873 ; giving a range of 2.370 inc. The greatest yearly height occurred four times in December, twice in March, and once in each of the months of January, February, April and November. The lowest yearly height occurred four

times in January, twice in February, twice in December, once in October and once in November. From this it appears clearly that the extremes of high and low barometer occur mostly in the winter, and never in any of the summer months, in which the range of the mercurial column is comparatively small.

I will now speak more in detail of other results relating to temperature, humidity, and the rainfall.

Temperature.—Temperature is undoubtedly the most important element to be determined in the investigation of the meteorology of a particular district. It is by mistake, sometimes popularly considered as almost the only point to which an inquirer need give his attention, before taking up his residence in a new country or a new locality. Is it a warm or a cold climate he asks, is its temperature adapted for invalids, or is it such as those who are not invalids can really enjoy? and both health and comfort depend much upon the answer he receives. In most cases, however, this question is one too general to admit of a direct answer. It needs to be resolved into other questions having reference to the temperatures of the seasons separately considered, as well as to the range of temperature, and the difference between the day and night temperatures, in each season. And these last points require especially to be attended to in the instance of the Bath climate, which—although it has a slightly higher mean temperature than several other English towns in about the same latitude, or not very much N. or S. of that latitude,—owes its chief distinction to its more temperate character, or to its extremes of heat and cold lying within a more contracted range, notably the fact both in very hot and in very cold seasons. But as I have elsewhere spoken of this feature in the Bath climate I need not dwell upon it here.* It will also clearly appear after stating the results of the meteorological observations carried on

* See a Paper on the Summer of 1868, as observed in Bath;—*Proceedings of Bath Natural History and Antiquarian Field Club*, vol. i. No. 3, p. 43.

for the last ten years at the Bath Literary and Scientific Institution. I would only observe at present in a general way that two places having identically the same mean temperature may yet differ widely in climate, from the much greater heat in summer, and the much greater cold in winter, in one of the localities than in the other.*

I proceed now to give the results above referred to in a series of Tables. It must however first be remarked, that the number of years is not the same in all the tables, from the circumstance of the Institution Registers having been commenced in 1865, in *March*, the first month of the spring, and not in *January* in mid-winter. This very well allows of the seasons being determined from ten years' observations, and perhaps these are the results of most value, but it does not allow of the mean temperature of each civil year, *i.e.* from January to December, being determined from more than nine years' observations.

TABLE I. *Showing the Mean Monthly and Yearly Temperatures deduced from the Daily Readings at 9 a.m. and corrected for diurnal range, from 1866 to 1874.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Mean.
1866	44.5	41.5	41.5	49.6	52.5	60.7	60.2	59.3	56.8	52.1	46.8	44.9	50.9
1867	36.7	46.4	38.7	50.1	53.4	57.8	60.4	61.9	58.6	50.8	40.0	39.8	49.5
1868	40.2	42.4	46.2	48.5	56.8	61.5	66.3	62.6	59.7	48.0	43.0	48.5	52.0
1869	43.6	46.8	40.4	51.6	50.2	56.8	63.2	61.2	59.5	51.6	44.2	38.7	50.7
1870	40.0	38.2	41.0	50.0	53.4	60.4	64.0	62.6	56.3	51.2	41.8	34.2	49.4
1871	35.2	44.8	46.0	49.8	53.8	55.8	60.5	65.1	56.5	50.5	38.4	38.3	49.6
1872	42.5	46.5	46.1	49.9	51.5	57.6	64.2	62.1	58.5	51.2	46.5	42.7	51.6
1873	43.8	36.9	43.0	47.8	52.5	57.9	63.2	61.3	56.1	47.9	45.3	42.5	49.9
1874	43.3	40.4	46.8	52.5	52.2	58.8	66.0	60.4	58.8	53.7	44.3	34.0	50.9
Monthly Mean.	41.1	42.6	43.3	49.9	52.9	58.6	63.1	61.8	57.8	50.7	43.3	40.4	50.5

* See further on this point "Observations in Meteorology," p. 359.

The mean temperature of Bath, deduced from nine years' observations 1866-1874, as seen in the above table, is $50^{\circ}.5$. The result is exactly the same, if deduced from ten years' observations, commencing with March 1st, 1865, and ending with February 28th, 1875.

The highest yearly mean during the above nine years was $52^{\circ}.0$, in 1868. The lowest yearly mean was $49^{\circ}.4$, in 1870. The range of the mean, therefore, may be set at $2^{\circ}.6$.

Five of the nine years were above the mean, viz. :—1866, 1868, 1869, 1872 and 1874. Four were below the mean, viz. :—1867, 1870, 1871 and 1873. The year making the nearest approach to the exact mean was 1869.

In 1868, the hottest year in the series, seven months were above the mean *monthly* temperature, viz. :—March, May, June, July, August, September and December. In 1870, the coldest year in the series, six months were below the mean monthly temperature, viz. :—January, February, March, September, November and December. And it is noticeable that in the former instance, the months in excess occur chiefly in the spring and summer, while in the latter instance, the months in deficiency occur chiefly in the autumn and winter. Hence, in a general way, not only does the excess of mean temperature in one of these years balance the deficiency in the other, but the balance would seem to be kept up as regards the particular months in which the excess and deficiency respectively occur.

If now we confine our attention to the monthly means in the bottom line of the above Table it will be seen that the mean temperature rises very slowly from January to March, but makes a sudden and considerable advance in the months of April and May. It then makes another and almost as great an advance in June, and the same again in July, in which month it attains its maximum. The mean temperature of August is but little below that of July. There is a decided fall in September and October, and a still more marked fall in November, the mean temperature of this last month being scarcely 3° above that of December when

the mean is at a minimum. It is worthy of remark that while the ascent of the mean temperature from the minimum to the maximum takes seven months, the descent from the maximum to the minimum takes only five. In other words the passage from winter to summer is much slower and longer about than the passage from summer to winter ; though in this last case, from the fall of temperature being not very rapid during the first three months of its decline, there is seldom much frost or cold in Bath previous to November.

TABLE II. *Showing the greatest Heat, as indicated by Maximum Thermometer, in each month, in each year.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Means.
1866	54.0	56.0	58.2	72.5	70.8	85.2	83.4	75.0	67.3	64.2	59.7	58.0	67.0
1867	56.4	57.0	57.2	62.0	77.8	78.4	77.6	84.2	76.3	66.0	59.5	56.2	67.3
1868	54.0	58.0	60.0	69.6	79.5	80.8	90.5	87.0	87.5	62.0	59.0	59.6	70.6
1869	56.4	60.0	54.0	77.3	66.2	83.8	87.0	88.7	74.0	74.2	58.0	57.7	69.7
1870	53.0	56.0	58.0	75.5	78.2	84.0	90.0	82.0	72.0	70.0	58.0	59.0	69.6
1871	47.7	55.7	68.0	62.0	78.0	71.0	79.0	85.2	78.0	66.0	54.6	51.7	66.4
1872	55.0	58.2	60.7	69.0	70.0	83.3	85.0	83.0	77.8	63.5	62.5	56.2	68.6
1873	55.0	49.0	64.3	71.4	70.3	76.5	88.8	79.0	73.0	73.4	57.0	55.0	67.7
1874	55.0	54.0	60.4	77.8	71.4	80.0	87.4	81.0	75.8	63.7	59.8	54.0	68.3
Monthly Means.	54.0	56.0	60.1	70.8	73.5	80.3	85.4	82.8	75.7	67.0	58.6	56.3	68.3

It will be seen here that the absolute maximum temperature during the above nine years has occurred four times in July, three times in August, and twice in June.

The absolute maximum has attained to 90° or upwards in only two years, 1868 and 1870,—in both instances, in the month of July,—the highest being 90°.5 in 1868.

There is no year in which it has not attained to 83° or upwards, the mean absolute highest for the whole period being 87°.

In no year has the absolute maximum attained to 70° before the month of April, in which month a temperature of 70° or upwards has occurred in five different years. Nor has the same

temperature been attained later in the year than October, in which month a temperature of 70° or upwards has occurred in three different years.

The absolute maximum has never attained to 60° in either December or January, and has only been as high as 60° or upwards in one instance in November, and in one instance in February.

TABLE III. *Showing the greatest Cold, as indicated by Minimum Thermometer, in each month, in each year.*

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Mean.
1866	23.7	22.8	23.5	32.0	29.5	44.0	45.7	43.4	37.7	31.7	27.5	26.8	32.3
1867	8.5	29.7	22.8	32.4	30.5	41.0	42.0	44.6	37.0	31.5	22.3	22.5	30.4
1868	21.5	26.5	26.5	25.0	36.6	41.3	46.4	46.4	43.2	28.0	24.2	33.7	33.2
1869	26.5	27.3	28.2	32.0	34.0	38.0	45.0	37.3	38.0	29.0	24.6	19.5	31.6
1870	20.0	21.7	23.0	27.0	30.5	44.6	45.7	40.0	38.0	28.0	26.0	12.6	29.7
1871	12.4	29.8	29.0	31.3	34.6	37.8	46.8	45.2	37.8	32.8	23.6	20.8	31.8
1872	29.0	35.0	24.2	32.0	34.6	37.2	45.2	43.6	34.4	32.8	31.8	26.6	33.7
1873	26.6	25.4	27.4	31.4	32.8	42.8	46.0	49.8	39.2	24.9	27.8	19.0	32.7
1874	28.0	24.0	25.2	32.8	31.8	38.6	46.0	45.0	41.6	36.0	28.8	15.8	32.8
Monthly Mean.	21.8	26.9	25.5	30.5	32.7	40.6	45.4	43.9	38.5	30.5	26.3	21.9	32.0

It appears from this Table that the absolute minimum temperature during the above nine years has occurred four times in December, three times in January, once in February, and once in March.

There are only three years, viz. :—1866, 1868 and 1872, in which the absolute minimum has not fallen as low as 20°; the lowest temperature reached being 8°.5 in January, 1867.

The mean absolute minimum for the whole period is 17°.3. The range of the absolute minimum during the nine years is 15°.7, extending from 8°.5 to 24°.2.

The months exempted from frost, or the months in which the absolute lowest has never fallen to 32°, are June, July, August and September. July is the only month in which the absolute

lowest has uniformly kept above 40° . In June it has fallen below it in four instances, getting as low as $37^{\circ}.2$ in June, 1872. In August it has fallen once below it, viz., in 1869, when it descended to $37^{\circ}.3$.

The results given in the next Table (Table IV.), showing the extreme range of Temperature in each month, might easily be obtained by inspecting together the two previous Tables (Tables II. and III.): still it may be desirable for convenience to have them tabulated separately.

TABLE IV. *Showing the extreme Range of Temperature taken from the highest Maximum and the lowest Minimum of each Month.*

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Mean.
1866	30.3	33.2	34.7	40.5	41.3	41.2	37.7	31.6	29.6	32.5	32.2	31.2	34.6
1867	47.9	27.3	34.4	29.6	47.3	37.4	35.6	39.6	39.3	34.5	37.2	33.7	36.9
1868	32.5	31.5	33.5	44.6	48.9	39.5	44.1	40.6	44.3	34.0	34.8	25.9	37.3
1869	29.9	32.7	25.8	45.3	32.2	45.8	42.0	51.4	36.0	43.2	33.4	38.2	38.1
1870	33.0	34.3	35.0	48.5	47.7	39.4	44.3	42.0	34.0	42.0	32.0	46.4	39.8
1871	35.3	25.9	39.0	30.7	43.4	33.2	32.2	40.0	40.2	33.2	35.0	30.9	34.5
1872	26.0	21.2	36.5	38.0	35.4	46.1	39.8	39.4	43.4	30.7	30.7	29.6	34.9
1873	28.4	23.6	36.9	40.0	37.5	33.7	42.8	29.2	33.8	48.5	29.2	36.0	34.1
1874	27.0	30.0	35.2	45.0	39.6	41.4	41.4	36.0	34.2	27.7	31.0	38.2	35.5
Monthly Mean.	32.2	29.0	34.5	40.2	40.8	38.6	39.9	38.8	37.2	36.4	32.4	34.4	36.2

This Table and (Table V.), the next to follow, may be spoken of together. They are perhaps of all the Tables hitherto given those of most importance for determining the climate of a particular locality, especially with reference to invalids. For this inquiry, as before observed, is not satisfied by simply knowing its mean temperature: we must know its fluctuations of temperature. Sudden and great fluctuations quite irrespective of climate no doubt at times occur everywhere. In unsettled weather in particular, there are often down-rushes of cold, due to great disturbances in the upper strata of the atmosphere, and causing in a very short time a considerable

depression of the Thermometer;* as, on the other hand, there may be a rapid rise of temperature from a sudden change of wind bringing in a south-westerly current next the earth to take the place of a north or north-easterly one. But the Tables in question have reference rather to those interchanges of the day and night temperatures, which though regular and of general occurrence are so much more marked in some localities than others. Where the contrast between day and night is very great it is much felt by invalids, and is prejudicial to health in many ways; where it is within moderate limits there is much less risk incurred by exposure to the outward air. Just as in a house, if we pass from a heated room to one that is much colder we feel the discomfort immediately, whereas if the whole house be warmed, though not to the extent of the particular room from which we come, we move about with less inconvenience. Indeed it has been thought that the rate of mortality is largely determined by the range of temperature of a climate.

TABLE V. *Showing the Mean Daily Range of Temperature taken from the mean of all the Maxima, and the mean of all the Minima, of each month.*

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Means.
1866	10.0	11.4	12.2	14.0	19.3	17.0	16.2	14.2	11.2	11.0	12.8	11.1	13.4
1867	11.8	9.5	10.1	11.1	15.8	16.5	16.4	15.9	15.1	13.4	13.9	11.0	13.4
1868	9.6	11.8	14.1	17.7	19.3	20.9	21.8	15.0	18.0	15.4	10.7	9.0	15.3
1869	11.1	10.2	10.9	17.0	14.7	19.1	19.4	19.3	13.6	13.3	15.1	10.3	14.5
1870	5.9	9.6	13.3	21.8	20.0	18.4	18.6	21.0	19.7	15.1	12.4	9.3	15.4
1871	7.8	9.2	14.9	13.8	19.2	15.2	13.9	19.9	14.5	13.9	7.8	11.5	13.5
1872	10.9	9.4	12.4	16.6	14.5	15.6	17.7	16.7	13.8	13.5	10.0	8.4	13.3
1873	8.1	7.8	13.5	15.6	17.7	15.5	17.2	13.2	14.8	14.9	9.4	9.7	13.1
1874	11.4	11.8	12.8	18.0	18.5	18.9	19.7	15.5	14.7	13.1	11.6	9.8	14.6
Monthly Means.	9.6	10.0	12.7	16.1	17.6	17.4	17.8	16.7	15.0	13.7	11.5	10.0	14.0

*Professor Loomis mentions, in *Silliman's Journal*, for July last (1875), an instance of a fall of temperature of 48° in one hour, at Denver, which, he conceives, could not have been produced otherwise than by some displacement of the air in a vertical direction.—("The Academy," Oct. 2, 1875, p. 362.)

The Range of Temperature in Bath, considered in connection with the two last Tables (iv. and v.), presents the following features :—

First ; the mean *monthly* range, or the mean difference between the absolute highest temperature and the absolute lowest temperature in each month, is least in February ; the months of November, December, January, and March, showing no very marked difference among themselves in this respect, but the range in all greater than that of February—by three degrees or more. A considerable rise of the range occurs in April and May, in which months, scarcely different in this respect from each other, the mean monthly range attains its maximum. There is very little difference also in the three summer months of June, July, and August,—in none of which the range is much less than that of April and May. In the two autumnal months of September and October, the range is seen to decline further from the maximum, and in November the decline is still more marked, the range in this and in the other winter months being spoken of above.

Secondly ; the mean *daily* range, or the mean difference between the highest temperature and the lowest temperature, in each twenty-four hours, rises gradually from a minimum in January to a maximum in July, then recedes, during the rest of the year, by steps nearly as gradual, till it reaches the minimum again. The chief circumstance noticeable is—that the greatest rise occurs in April ; the daily range of temperature in which month is $3^{\circ}4$ in excess of that of March. This rise is followed by a less one in May ; the range during that month, and the three following summer months, being nearly the same.

It is, however, the mean *daily* range of temperature, and not the mean *monthly* range, that is of most consequence in considering the conditions of a climate. It is quite natural, however, that both these ranges should be greatest in the warmer months and lowest in the winter, as we see them to be in Tables iv. and v.

But, then, in these seasons the range is, for the most part, steady, varying but little ; while it is the sudden rise or fall of the range, when the day temperature is suddenly raised much above what it had been a short time before—the night temperature remaining the same, or, perhaps, falling lower—of which persons are ordinarily most sensitive. And this irregularity will be found also in both Tables, to occur in the spring. The cause, no doubt, is the prevalence of easterly winds, accompanied by a very dry state of the air, at that season, rendering the nights very cold, notwithstanding the great power of the sun during the day, to heat the lower strata of the atmosphere. Hence it is that the spring season is so trying, not merely to certain classes of invalids, but sometimes even to healthy people. Bath certainly does not afford entire exemption from this evil ; but it will be shown further on that, whatever may be its increased mean daily range of temperature in spring, to give it any disadvantage, there is a still greater increase of the same, and, in consequence, a greater disadvantage, in several other towns shortly to be compared with it.

Next in importance to ascertaining the mean daily range of temperature, is the determination of the temperature of the several seasons at Bath, set down for each of ten years in the Table on the following page

TABLE VI. *Mean Temperature of the Seasons for ten years, commencing with March, 1865, and ending with February, 1875. The three months of March, April, and May being considered as Spring; June, July, and August as Summer; September, October, and November as Autumn; December, January, and February as Winter.*

	Spring.	Summer.	Autumn.	Winter.
1865	47.8	61.4	52.7	43.4
1866	47.8	60.1	51.9	42.7
1867	47.4	60.0	49.8	40.1
1868	50.5	63.5	50.2	46.3
1869	47.4	60.4	51.8	39.0
1870	48.1	62.3	49.7	38.1
1871	49.8	60.1	48.5	42.4
1872	49.2	61.3	52.0	41.1
1873	47.7	60.8	49.7	42.1
1874	50.5	61.7	52.2	38.9
Means.	48.6	61.1	50.8	41.4

It will be noticed in the above Table that the mean temperature of each season varies considerably, and that it varies more in some seasons than in others. The range of the mean increases as the year advances; being least in spring and greatest in winter. This leads to the inference that the winter season, at least in Bath, is of a more variable character, as regards temperature, than any of the other seasons.

The mean temperature of spring varies from 47°.4 to 50°.5, the range of the mean being 3°.1.

The mean temperature of summer varies from 60°.0 to 63°.5, the range of the mean being 3°.5.

The mean temperature of autumn varies from 48°.5 to 52°.7, the range of mean being 4°.2.

The mean temperature of winter varies from $38^{\circ}.1$ to $46^{\circ}.3$, the range of the mean being $8^{\circ}.2$.

In the above decade of years five summers were *above* the mean, viz., 1865, 1868, 1870, 1872 and 1874; and five were *below* the mean, viz., 1866, 1867, 1869, 1871 and 1873.

The hottest summer was that of 1868, the temperature being $2^{\circ}.4$ above the mean.

The coldest summer was that of 1867, when the temperature was $1^{\circ}.1$ below the mean.

Of the winters also, five were *above* the mean, viz., 1865-6, 1866-7, 1868-9, 1871-2 and 1873-4; and five were *below* the mean, viz., 1867-8, 1869-70, 1870-1, 1872-3 and 1874-5.

The mildest winter was that of 1868-9 (following the hottest summer) when the mean temperature rose to $46^{\circ}.3$, being $4^{\circ}.9$ above the mean of the whole decade.

The coldest winter was that of 1870-1, when the mean temperature fell to $38^{\circ}.1$, being $3^{\circ}.3$ below the mean of the whole decade.

Having thus ascertained the mean temperature of each season in Bath, the next point of interest is to compare these temperatures—along with the high and low extreme temperatures, and the mean daily range—with those of other towns, for the same decade of years;—such towns especially as lie more to the east, south-east, or north-east of Bath, in order to see what advantages Bath has over them, or what differences there may be. For this purpose Oxford, Greenwich, Royston and Norwich, have been selected; not but there are other towns which it might be desirable to add to the number, but these are chosen as the only towns from which returns were to be had, suited to the inquiry we wish to make. The returns themselves are taken from Mr. Glaisher's Meteorological Tables appended to the Registrar-General's "Quarterly Returns of Births, Deaths and Marriages."*

* The spring and summer mean temperatures of Norwich are calculated from only *eight* years' observations, there being no complete returns for the years 1865 and 1867. Also the autumn mean temperatures of Norwich are calculated from only *nine* years' observations, there being no complete return for 1865.

TABLE VII. *Comparative Temperatures of Bath, Oxford, Greenwich, Royston and Norwich; showing the Mean Temperature, the Mean of all the Highest, the Mean of all the lowest, and the Mean Daily Range, in each of the four seasons, from ten years' observations, March, 1865—February, 1875.*

SPRING.

	Bath.	Oxford.	Greenwich	Royston.	Norwich.
Mean Temperature ...	48.6	47.8	47.4	46.8	46.2
Mean of all the Highest...	56.6	56.4	57.9	58.2	54.9
Mean of all the Lowest ...	41.1	40.1	39.4	38.4	39.3
Mean Daily Range ...	15.5	16.3	18.5	19.8	15.6

SUMMER.

	Bath.	Oxford.	Greenwich	Royston.	Norwich.
Mean Temperature ...	61.1	60.8	61.3	60.4	59.9
Mean of all the Highest...	70.4	70.9	73.6	73.7	70.1
Mean of all the Lowest...	53.1	51.8	52.2	50.8	52.2
Mean Daily Range ...	17.3	19.1	21.4	22.9	17.9

AUTUMN.

	Bath.	Oxford.	Greenwich	Royston.	Norwich.
Mean Temperature ...	50.8	49.9	49.9	49.4	49.3
Mean of all the Highest...	57.8	56.7	58.3	58.5	55.9
Mean of all the Lowest ...	44.1	43.1	43.2	42.7	43.1
Mean Daily Range ...	13.6	13.6	15.1	15.8	12.8

WINTER.

	Bath.	Oxford.	Greenwich	Royston.	Norwich.
Mean Temperature ...	41.4	39.8	39.8	39.3	38.9
Mean of all the Highest...	46.2	44.8	44.9	44.7	43.5
Mean of all the Lowest...	36.4	35.5	35.0	34.1	33.9
Mean Daily Range ...	9.8	9.3	9.9	10.6	9.6

Comparing, now, the results above tabulated—without going closely into figures to express the exact differences between the several towns as regards temperature, which is hardly necessary for our purpose,—it may be sufficient to make a general statement on the subject. And, first, it is evident that the mean temperature of Bath, during the cold seasons of winter and spring, is decidedly higher than that of any of the other towns selected for comparison, this difference augmenting as the towns lie more and more to the east. It is still slightly higher in autumn, though there is very little difference at that season among the other towns themselves. In summer, however, all the towns, Bath included, are so nearly on an equality, as regards the *mean* temperature, that what slight differences appear are of no significance. This may surprise some persons, but, as before stated,* two places may have the same mean temperature and yet have different climates, arising from other meteorological conditions; especially conditions connected with the night and day temperatures. And this holds equally good of any particular *season* in which the mean temperatures are the same at the two places, while at other seasons they may be different.

Hence the next point is to ascertain what differences present themselves on comparing the mean highest and lowest temperatures at Bath with those of the other towns in the above Table.

* See p. 213.

Now it will be seen that both in spring and summer the extreme night and day temperatures recede from each other less in Bath than they do in any of the other towns ;—this being especially the case in summer, the distance to which they then recede being remarkably less, compared with Greenwich and Royston in particular. In other words, the mean of all the highest does not rise so high, nor the mean of all the lowest fall so low, in Bath in these seasons as in the other towns, the difference in the case of Royston amounting in summer to more than five and half degrees.

It is this more contracted mean diurnal range of temperature which is the chief characteristic of the Bath climate in summer, rendering the days not so hot and the nights not so cold as in other places lying more to the east.

In autumn this difference in the mean diurnal range at Bath compared with the other towns is much less apparent, and in winter it almost entirely disappears. What is it then that gives the Bath climate an advantage in winter ?—We have already shown that it has a higher mean temperature at that season, but in addition to this it will be seen that—just contrary to what takes place in summer—the mean of all the highest rises higher, and the mean of all the lowest does not fall so low, as in other places :—the mean daily range remains the same, or very nearly the same, from the circumstance of the mean extreme temperatures, though both falling absolutely lower than in Bath,—yet falling relatively to the same extent, so as to preserve the same difference (about ten degrees) in all the towns, by which difference the mean daily range is measured.

In the above remarks on Table VII, I have taken little or no account of Norwich, except as regards the winter season results. The Norwich results relating to the other seasons appear unsatisfactory, in consequence, I imagine, of the returns from that place being incomplete for spring, summer and autumn, as already alluded to.*

* See p. 222. (Note).

It may be useful now, to sum up in a few words, the chief advantages which Bath enjoys above the other towns we have been comparing it with in each of the four seasons of the year.

In spring Bath has a higher mean temperature, while the night temperatures are not so low, and the mean daily range is less, when compared with Greenwich and Royston especially.

In summer the mean temperature is not different from that of the other towns, but the extreme night and day temperatures are both of them more moderate, the mean daily range being still more contracted than in spring, in relation to those towns.

In autumn the mean temperature is only very slightly higher than that of other places, the extreme day temperatures scarcely so high as some of them, but the nights are not so cold, the minimum not falling so low.

In winter the mean temperature is decidedly higher, the extreme day and night temperatures also both higher, though the mean daily range shows scarce any difference.

Let us now pass from the east to the west of England, without going north of the Bristol Channel, in our comparison of the temperature of Bath with that of other towns. It is hardly to be expected that there would be as much difference here as in the case of the eastern towns. Still the inquiry is not without interest. The chief town in this direction, and which seems to offer itself first as a fit one for comparison, is Exeter. Unfortunately I know of no observations made there which synchronize with those made at Bath, so that an exact parallel between the two towns cannot be obtained. The same is the case with Clifton, which like Bath is much resorted to by invalids as well as by others, and which on this account, as also from its proximity to Bath, quite deserves to be considered along with it in its meteorological relations. Yet in neither case are we entirely without observations—even carried on for a series of years, though a different series from that of the Bath observations—as a ground for comparison to a certain extent. Dr. Shapter, in his valuable

work on the climate of South Devon,* has given copious details respecting the meteorology of Exeter, including a Register of the results of many years' daily observations on its temperature, humidity, rain-fall, &c., which render us great assistance in this matter. Dr. Burder, again, has written on the meteorology of Clifton.† Dr. Shapter's observations on temperature extend over thirty years commencing with 1824 and ending with 1853 ; those relating to the humidity were continued for nineteen years ; while the estimate of the rain-fall is deduced from forty-four years' measurements commencing with 1817 and ending with 1860. Dr. Burder's observations at Clifton were carried on for ten years commencing with 1853 and ending with 1862.

Confining ourselves here to the subject of temperature, Exeter and Clifton being thus differently circumstanced from some other towns in the west of England with which also I propose to compare Bath presently, I will first give a Table of results, in which Bath, Clifton and Exeter stand together, the Bath observations being as before for the decade of 1865-1874, those of Clifton for the decade of 1853-1862, those of Exeter for thirty years, 1824-1853. It will be noticed that the Exeter observations are the earliest, terminating the same year in which the Clifton observations commence, the Bath observations not commencing till three years after the Clifton observations terminated.

* The climate of the South of Devon, and its influence upon health, &c. 2nd. Ed. 8vo. London, 1862.

† Meteorology of Clifton, Bristol, 1863.

TABLE VIII. *Showing the Mean Temperature, Mean of all the Highest, Mean of all the Lowest, and Mean Daily Range, for each month at Exeter, Clifton, and Bath.*

	Exeter.				Clifton.				Bath.			
	Mean Temp.	Mean Highest.	Mean Lowest.	Mean Daily Range.	Mean Temp.	Mean Highest.	Mean Lowest.	Mean Daily Range.	Mean Temp.	Mean Highest.	Mean Lowest.	Mean Daily Range.
	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
Jan.	39.8	44.5	35.1	9.4	38.9	43.2	34.7	8.5	41.1	46.0	36.4	9.6
Feb.	41.3	46.3	36.2	10.1	38.2	43.5	33.5	10.0	42.6	47.2	37.2	10.0
March	43.3	49.4	37.2	12.2	41.3	48.7	35.8	12.9	43.3	49.1	36.4	12.7
April	47.9	55.3	40.5	14.8	45.8	55.9	38.9	17.0	49.9	58.2	42.1	16.1
May	54.5	62.5	46.2	16.3	51.2	62.0	43.9	18.1	52.9	62.2	44.6	17.6
June	59.8	67.9	51.8	16.1	56.9	67.5	50.5	17.0	58.6	68.2	50.8	17.4
July	62.6	70.7	54.5	16.2	59.8	69.9	53.7	16.2	63.1	72.6	54.8	17.8
Aug.	61.8	69.7	53.9	15.8	60.1	69.9	53.5	16.4	61.8	70.3	53.6	16.7
Sept.	57.4	64.6	50.2	14.4	55.9	65.1	49.3	15.8	57.8	65.6	50.6	15.0
Oct.	51.5	57.6	45.4	12.2	50.8	57.5	45.8	11.8	50.7	57.6	43.9	13.7
Nov.	45.7	50.9	40.3	10.6	41.1	46.6	36.2	10.4	43.3	49.3	37.8	11.5
Dec.	42.2	46.7	37.6	9.1	40.2	44.4	36.0	8.4	40.4	45.5	35.5	10.0

Taking Exeter in the first instance and looking to the mean temperature, it will be seen in the above Table that the first four months of the year—with the exception of March, which has the same mean temperature at both places,—are colder at Exeter than at Bath. The mean difference is $1^{\circ}.1$ and in favour of Bath. May and June on the contrary have a lower mean temperature at Bath than Exeter. July, August and September, show very little difference, the mean temperature of August being, as in March, exactly the same at the two places; while October, November and December are colder at Bath than Exeter, the mean difference here being $1^{\circ}.7$ in favour of Exeter, and exceeding the difference in the case of January to April above noticed.

These results would seem to indicate that from some cause or other the early part of the winter on an average is colder at Bath

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than at Exeter, while the latter part, commencing with the new year, is just the reverse—colder at Exeter than at Bath. And this is to a certain extent confirmed by a comparison of the mean *extreme* temperatures at the two places, more especially in the three last months of the year, when the mean highest is nearly 1° , and the mean lowest 2° , lower at Bath than at Exeter; the mean daily range also being greater at Bath for the same three months. At the expiration of the cold period, the spring apparently advances at Exeter faster than at Bath.—These differences however might quite disappear if observations were made contemporaneously at the two places for a long term of years.—As it is, they compensate one another to a great extent, the mean temperature for the whole year at Exeter; being, according to Dr. Shapter, $50^{\circ}.7$, higher than the mean yearly temperature at Bath, though only by two-tenths of a degree, a matter of no significance under the circumstances.

Next comparing Clifton with Bath, it is noticeable that the mean temperature of every month there is lower than at Bath excepting October, the greatest difference, in this instance also, showing itself in the first four months of the year. In respect of these months taken together, the difference amounts to $3^{\circ}.2$, or Clifton is so much colder than Bath at that season. The months in which there is the least difference in the temperature of the two places are May, June and August, the difference here being only $1^{\circ}.7$, and exactly the same in each of those months. The mean temperature for the whole year at Clifton is set by Dr. Burder at $48^{\circ}.4$, or more than two degrees below that of Bath. There is a corresponding difference in most of the months in regard of the mean highest and lowest temperatures, October and December being the only months in which there is any difference in favour of Clifton, the mean lowest there in those months being higher than in Bath, in October indeed to the amount of nearly two degrees. But, as in the case of Exeter, too much reliance must not be placed on these comparative results, deduced as they are

from the observations of two distinct decades of years, which may vary, and often do vary much, in their meteorological conditions. In respect of Clifton in particular, something also is probably due to a considerable difference in elevation.

From Exeter and Clifton I pass to the towns of Taunton, Barnstaple and Truro, the only towns west of Bath, returns from which—synchronizing with the Bath observations—appear in the Registrar-General's Quarterly Reports. Nor do these returns afford a parallel for more than eight years, 1867-74, except in two cases out of the three, Taunton being deficient for the two first years of the decade. Hence I have been obliged to confine myself to the above eight years in making a comparison of the several seasons at the three towns in question with the same seasons at Bath. The results are given underneath in the same forms as in the Tables previously given at p. 223.

TABLE IX. *Comparative temperatures of Bath, Taunton, Barnstaple and Truro ; showing the mean temperature, the mean of all the highest, the mean of all the lowest, and the mean daily range, in each of the four seasons, from eight years' observations, March, 1867—February, 1875.*

SPRING.

	Bath.	Taunton.*	Barnstaple.	Truro.
Mean Temperature	48.4	48.8	49.5	48.6
Mean of all the Highest	56.8	58.5	57.7	56.8
Mean of all the Lowest	41.3	40.4	43.6	42.9
Mean Daily Range	15.5	18.1	14.1	13.9

* The Taunton returns being deficient for the months of April and May in 1873, this year is omitted in calculating the spring temperatures, and the results consequently are the less trustworthy.

SUMMER.

	Bath.	Taunton.*	Barnstaple.	Truro.
Mean Temperature	61.0	60.6	61.5	59.7
Mean of all the Highest	70.7	72.8	70.9	69.2
Mean of all the Lowest	53.1	50.9	54.3	53.4
Mean Daily Range	17.6	21.9	16.6	15.8

AUTUMN.

	Bath.	Taunton.	Barnstaple.	Truro.
Mean Temperature	50.3	50.1	51.9	51.9
Mean of all the Highest	57.4	58.8	58.6	58.9
Mean of all the Lowest	43.8	43.0	46.4	46.4
Mean Daily Range	13.6	15.8	12.2	12.5

WINTER.

	Bath.	Taunton.	Barnstaple.	Truro.
Mean Temperature	40.9	41.3	43.1	44.0
Mean of all the Highest	45.9	47.0	47.5	49.0
Mean of all the Lowest	36.3	35.2	38.3	39.5
Mean Daily Range	9.6	11.8	9.2	9.5

On close inspection, the preceding Tables are found to present no very marked differences in the results obtained by a comparison

* From deficiency in the returns for 1868 and 1872, results only calculated from six years' observations, and allowance must be made for probable error.

of the temperatures of the above towns, none at least that hold in all the seasons, so as to afford ground for regarding their respective climates materially different,—temperature alone considered. A few particulars, however, are noticeable which are worth pointing out.

1st.—The mean temperature of Bath (passing over Taunton) is lower than that of either Barnstaple or Truro in all the seasons except summer. The difference in autumn is more than one degree and a half. In winter, it is more than two degrees in the case of Barnstaple, and more than three degrees in the case of Truro. The mean extreme temperatures are also proportionally lower at Bath than at the two last mentioned places, which consequently appear to have a decidedly milder climate than Bath, with higher night temperatures, as well in autumn as in winter.

The mean daily range, so important an element in climate, is greater in all the seasons at Bath than at Barnstaple and Truro, though there is not much difference in this respect in winter.

2nd.—Barnstaple and Truro, compared with each other, have their climates almost identical in autumn as regards temperature. The temperature however at Barnstaple falls below that of Truro in winter,—nearly a degree in the case of the mean, and more than a degree in the case of the mean extreme temperatures.

3rd.—The Taunton climate in respect of temperature is not very dissimilar to that of Bath in the autumn and winter, the only seasons in which a strict comparison can be made between the two places in the present instance, the Taunton spring and summer temperatures in the above Tables not being thoroughly trustworthy for reasons already stated. Could the latter seasons be included in the inquiry, a nearer approach to identity of climate would probably be established :—yet it must not be overlooked that in both autumn and winter the mean diurnal range of temperature is more than two degrees greater at Taunton than at Bath, placing the former town at a slight disadvantage compared with the latter.

Vapour and Humidity.—There is always more or less vapour diffused through the atmosphere, though it varies much, not merely in quantity but in the mode of its distribution. Sometimes the vapour prevails most in the higher or cloud regions, sometimes in the strata of air just above the earth. Either the higher or the lower strata may be in a state of saturation, while the other strata are comparatively dry, the two opposite conditions of moist and dry passing into each other gradually.

The presence and the amount of this vapour have such a marked influence upon weather and climate, that it is quite of equal importance to determine its variations, as it is to determine the variations of atmospheric pressure and temperature. Hence the dry-and wet-bulb thermometer, or some other form of hygrometer, though much less frequently attended to, is as necessary an instrument in a meteorological observatory as the barometer or thermometer. Without combining observations of the former instrument with those of the two latter, we are apt to mistake the indications of these last, especially when they run counter to commonly received notions. Persons frequently express their surprise at rain falling with a high barometer, or at the absence of rain with a low barometer. Or they see changes of weather taking place without either barometer or thermometer showing any particular sign; even the wind perhaps remaining in the same quarter as indicated by the vane. In these cases they overlook the important part played by vapour, with its own separate influence upon the weather, and forget how necessary it is to know what is going on above our heads as well as near about us; the barometer no doubt revealing the former to some extent, but its variations liable to be counteracted by the intermingling of opposite currents above, while the current next the earth remains unchanged.

Thus persons rise in the morning and find it wet, the rain coming steadily down, yet the barometer high, and just where it was the night previous; the thermometer also not very different.

They are at a loss to understand it. But the dewpoint if attended to would often explain the circumstance. This would probably be found to have risen, speaking to an increased humidity of the air, in consequence of a westerly or south-westerly current suddenly mixing with a colder stratum in some part of the atmosphere, and causing condensation. The introduction of such a current would not necessarily entail a fall of the barometer, as northerly currents at higher elevations might still so prevail as to keep up the pressure. The rain in such a case, however, would probably be only for a few hours.

At another time the barometer may be observed falling for a whole week without any rain occurring till near the close of it, the wind and temperature remaining all the while unaltered. Such a circumstance often attends the breaking up of fine weather after a dry period of long continuance. It points to the gradual substitution of a south-westerly wind for a north-easterly, the moister and warmer current setting in first in the higher strata of the cloud region, the strata next beneath slowly revolving in succession after it, the stratum just above the earth not being affected till the last, when the vane suddenly turns round, the temperature rises, and rain ensues. The gradual increase of humidity in the air, as the south-westerly current works its way more and more into the lower strata, would here be revealed by the wet-and dry-bulb thermometer its movements synchronizing to some extent with the descent of the barometer, though no marked change of weather might follow for several days.

As considerations on the vaporous portion of our atmosphere serve to explain states of weather which would not be otherwise intelligible, so also do they assist us in forecasting the weather that is to be during the day. Whether it shall be wet or fine often depends upon the temperature and dewpoint in their relations to each other,—upon the fall or rise of one of the two, the other perhaps remaining unchanged,—though sometimes, no doubt, the result, whichever it may be, is due to influences beyond

the reach of our instruments. A fall of the temperature may bring on first cloud and then rain ; a rise of the dewpoint may do the same ; the wet-bulb making no move in the first instance, the dry-bulb making no move in the second instance. On the other hand a rise of the temperature or a fall of the dewpoint may have the contrary effect,—if rain is falling causing it to cease, and the clouds to disperse. Or to take another case, the air may be nearly saturated with moisture causing mist or fog, the temperature of the air and dewpoint being the same, but no rain falling so long as the wind is steady to one point ; then let the wind shift a little, a mixture of airs of different temperatures ensues, and the fog turns to rain.

The same considerations help us also to explain another circumstance connected with weather phenomena, and that is the occurrence of very unequal falls of rain at different times during changeable weather, without any proportionate difference in the temperature of the air, the temperature of the dewpoint, or even in some cases the height of the barometer. Our meteorological instruments being ordinarily fixed at a very inconsiderable height above the ground, the indications of the wet and dry-bulb thermometers relate of course only to that stratum of air in which they are placed. The barometer indeed tells us the whole weight of the atmospheric column above our heads ; but the height of the mercury is determined mainly by the weight of the air alone, the additional height due to the elasticity of the vapour contained in the air being comparatively small. Consequently, though there may be a large increase of vapour at any time, this would not show itself by its effect on the barometer to the same extent that an increase in the volume of the air itself would.

The meteorological registers kept at the Literary Institution supply us with many instances serving to illustrate what has been said above.

Thus two rainy days sometimes occur in the same month, and standing almost next to one another, with scarce any difference

between them in the indications of the barometer and thermometer, yet the quantity of rain on one of the days nearly double what it is on the other.—This must be due either to an increased amount of vapour brought in suddenly by south-westerly currents at the elevation at which condensation takes place, or to a lowering of the temperature at that same elevation by the influx of a northerly current, neither of which circumstances would necessarily, or at least immediately, affect any instruments near the ground—not even the vane, though relatively so much higher than the other instruments, for reasons already stated.

Sometimes again, on two consecutive days, each with some rain, when the humidity on both days is at saturation point, the temperatures of the air and dewpoint being therefore coincident, and when these temperatures are also *absolutely* the same on both days, with little difference too in the barometer, a much larger fall of rain is found on one of the days than on the other, owing to a change of wind below ;—the cause and its effects being here the same as in the last-mentioned instance, only the former at once manifested by the vane.

Many other instances of a similar kind might be brought forward from the daily registers. It is noteworthy also that several of the monthly summaries show the like discrepancies between the results of the instruments, and the general character of the weather as regards wet and dry.

Thus January, 1869, had a rainfall exceeding five inches, and more than double that of January, 1872, yet the mean height of the barometer was very nearly the same in both months ; in fact that of January, 1869, which had *most* rain was the *higher* of the two. But the mean temperatures of the air and dewpoint were each of them three and a half degrees higher in 1869 than in 1870, the humidity too being 90 (saturation=100) in the wet January, and only 86 in the drier January. These differences quite explain the circumstances above stated.

If now we look to the month of December, 1872, and compare

it with December, 1873, we find in some respects the converse of the last instance. The mean height of the barometer in 1872 was lower by seven-tenths of an inch than in 1873, but the mean temperatures of the air and dew-point were nearly the same, and the mean humidity absolutely the same in both months. Yet while the rain-fall in December, 1872, amounted to 4.825 in., that of December, 1873, was only 0.564 inches, or more than eight times less. These results seem to point to the higher strata of the air,—above the action of the instruments, barometer excepted,—as the source of the increased condensation in 1872.

A few examples may be taken from the summer months. Thus June 1868 and June 1869 are remarkable for having had the mean height of the barometer very nearly the same (only a difference of seven-hundredths of an inch), and the mean dew-point absolutely the same, in both months. But a great difference occurs in the mean humidity and in the rain-fall. In June, 1868, the mean humidity is only 72, and the rain-fall little more than half an inch. In June, 1869, the mean humidity is 81, and the rain-fall nearly an inch and a half. This difference is quite explained when we look to the mean temperature of the air in the two months, that of June, 1868, being nearly five degrees higher than in June, 1869; and it shows that the general temperature must be taken into account, as well as the barometer and dew-point, when inquiring into the causes of rain and humidity.

Comparing again June 1872 with June 1873,—between which months there is not much difference either in the mean height of the barometer, or in the mean temperature of the air, or in the mean depression of the dew-point below the temperature of the air,—we find the rain-fall of June, 1872, more than three times that of June, 1873. It is also observable that the mean relative humidity of the former month was 82 while the mean relative humidity of the latter was 86, so that the month with the less quantity of rain was much more humid than the month with the larger quantity of rain. This, however, is but an instance of

what has been often noted by meteorologists, that there is no direct connection between humidity and rain-fall, and that they often rise from entirely opposite conditions of the atmosphere.

The above instances selected from the Registers of the Literary Institution, taken in connection with the remarks preceding them, clearly show how necessary it is to attend to the several agencies by which different states of weather are brought about in this changeable climate *collectively*, if we would thoroughly understand weather phenomena, as well as understand the working of our instruments by which we seek to explain those phenomena. It shows that we must not trust to any one instrument alone, nor indeed in some cases to all instruments combined, without taking into consideration what may be going on higher up in the atmosphere beyond the limits of their sensitiveness. Other conditions may prevail above than those which prevail below, and such as can only be definitely determined by balloon observations, of which we hereby see the value, and which have already given us much important knowledge respecting the distribution of temperature and vapour at different elevations above the earth's surface. It is manifest, nevertheless, in some cases how complicated is the action of these two elements of weather—temperature and humidity—even at the level at which our instruments are fixed, sometimes one and sometimes the other, by excess or defect, entirely altering the condition of the air; sometimes both co-operating, either in opposite or in the same directions, to make the weather agreeable to our feelings or the reverse.

And this leads to the question of climate and health, and the effect which the ever-varying conditions of the atmosphere have upon certain constitutions. Our sensations as affected by weather depend perhaps more upon the relative variations of heat and moisture than upon any other circumstances; and these two are often quite different at the same place at different times. A month or a season may be very hot and very dry, or the humidity

of the air may be great, with either a low or a high temperature. The exact influence of these changes upon the human frame doubtless depends much upon the health and temperament of each particular person. A state of weather that occasions no inconvenience to some persons may be highly prejudicial to others. Yet even the strongest are liable to feel the changes more or less.* We almost all complain of the heat when the thermometer gets up to 80° or more, and how much is our discomfort increased when this high temperature is combined with a high dew-point, such as usually occurs with a south or south-west wind, the air being then especially what we call sultry, causing a feeling of lassitude, and indisposing to any exertion of body or mind.

If, on the other hand, the temperature is low, whether in winter or summer, and the air dry with northerly winds, we do not think much about the cold, but rather feel braced for work and out-of-door exercise. If, however, in winter especially, without any rise of the temperature, the air after a time becomes loaded with moisture from the setting in above of a south-westerly wind, the current next the earth being still from the north, it is then to our feelings what we call *raw*, or both cold and damp, and more hurtful perhaps to persons in delicate health, if exposed to it, than any other ordinary weather.

Now certain of these weather conditions may prevail to a greater degree in a particular locality than in other localities not very far off. Climate is often determined by local causes ; by the nature of the soil, by proximity to the sea or large sheets of water, or by the configuration of the ground. Such agencies exercise an influence independent of the usual atmospheric changes, and are always operating to the advantage or disadvantage of a

* It is said of Goethe, that "though his frame was strong and muscular," and though "excelling in all active sports, he was almost a barometer in sensitiveness to atmospheric influences."—*Lewes's Story of Goethe's Life*. p. 49.

place as the case may be. Bath is an instance in which the climate is undeniably affected by the last of the above-mentioned causes, the hills that surround it on nearly every side giving it a more moderate temperature both in summer and winter. Yet it is under a disadvantage, so far as these same hills materially interrupt a free circulation of the air in hot weather, while the river along the valley is constantly exhaling vapour to increase its humidity.

From this circumstance, the combined influence of temperature and humidity, in the case of the Bath climate, calls for especial consideration. And I have been led to say the more on this subject, because, by those who have treated of the Bath climate hitherto, it has been very little attended to, if not entirely passed over. No meteorological Journal ever kept in Bath or its neighbourhood, which has come under my notice, with the exception of the register formerly kept at Ensleigh by the late Mr. Weston, and of which I shall have to speak further on, contains any observations on this head. The barometer and ordinary thermometer, with the additions in some cases of the wind-vane and rain-gauge, have been carefully registered, but no column has been allotted to the dry-and wet-bulb, or to any other form of hygrometer, from which we might ascertain the variations from month to month and from season to season in the humidity of the Bath atmosphere. It is of interest also to ascertain the relation of this humidity to the rain-fall, the more so from their respective variations being very different. Dr. Tunstall, in his "Climate of Bath,"* seems to confound these two things. Under the head of "Humidity" he treats of the rain-fall alone, giving Tables of the latter, from which he arrives at the conclusion "that Bath does not deserve the character for humidity which has been generally imputed to it."

What the rain-fall of Bath is will be considered further on.

* p. 39.

That Dr. Tunstall's judgment with regard to its humidity is not correct will be made to appear presently. In fact the amount of rain at any place and the humidity of the air are two quite distinct elements of climate. In that part of Cambridgeshire bordering upon the fen districts where I formerly lived, I can state from long observation that the air is more or less damp during a great part of the year in consequence of a clay soil that retains the wet, though the rain-fall there is less than almost anywhere else in England. I might appeal to others also on this head. Thus Dr. Burder remarks "that an increase of moisture in the air does not involve an increased fall of rain;" and that "a large monthly fall of rain is consistent with a dry mean state of the atmosphere, and *vice versa*."* Mr. Lowe also, in his "Climate of Nottingham," remarks that in the year 1852, "the mean degree of humidity was slightly *less* than the average," though the amount of rain fallen was $9\frac{1}{2}$ inches *more* than the average.†

Let us now look more closely into the question of the humidity of Bath, and see what light is thrown upon it by the observations in the gardens of the Literary Institution as recorded in its daily registers.

The following Table gives in four columns (1) the mean temperature of the dew-point, (2) the mean depression of the dew-point below the temperature of the air, (3) the mean elastic force of vapour, and (4) the mean degree of humidity, for each month, deduced from the observations of nine years, 1866-1874.

* Meteorology of Clifton, 1863.

† Climate of Nottingham, p. 50.

	Mean Temperature of Dewpoint.	Mean Depression of Dewpoint.	Mean Elastic force of Vapour.	Mean Humidity, Saturation =100.
January	37°.6	3°.5	Inches. 0.232	87
February	39.1	3.5	0.243	88
March	38.3	3.9	0.236	84
April	43.7	6.2	0.289	78
May	44.2	8.7	0.305	73
June	52.4	6.2	0.397	81
July	56.1	7.0	0.450	78
August	55.5	6.2	0.447	82
September	52.6	5.2	0.401	82
October	46.6	4.1	0.321	87
November	40.1	3.3	0.251	89
December	37.0	3.4	0.225	89
Means	45.3	5.1	0.316	83

The results given in the above Table are not obtained by direct observation, but are deduced from daily observations of the dry- and wet-bulb thermometer with the help of Glaisher's "Hygrometrical Tables." There are other results relating to atmospheric vapour which might be obtained in the same way. But these seem sufficient for our present purpose. The point of chief interest is to ascertain the relative humidity of the air in the several months and seasons, or "the quantity of moisture present in relation to the quantity required to saturate the air at the existing temperature." It is the amount of vapour made sensible to us by condensation; vapour, previous to condensation, being

perfectly dry as well as transparent, and exerting no influence upon our feelings.

The *relative humidity*, therefore, must not be confounded with the *absolute* amount of vapour present in the atmosphere, or—as it has been sometimes called—the *absolute humidity*, which varies very differently from the former, and is often least when the relative humidity is greatest, and *vice versa*. The absolute amount of vapour depends upon temperature, the air having an ~~increased~~ capacity for aqueous vapour as the temperature increases. Hence in summer the amount is much larger than in winter, whereas in the case of the relative humidity it is just the reverse. Here the maximum is in winter. For though the sun at this season, from its reduced evaporating power, raises but little vapour from the earth's surface, the air nevertheless is extremely humid from increased condensation due to cold.

In proportion to the temperature also will be the elasticity of the atmospheric vapour, or its power to sustain more or less of the mercurial column. This elastic force is given for each month in the third column of the above Table, and to a certain extent the *absolute* amount of vapour is represented by it. And it will be seen, agreeably to what is above stated, how this quantity increases as the year advances, attaining its maximum in the summer months of July and August ; it then gradually declines till it gets to a minimum in December and January.

The *relative* humidity is partly indicated in the second column of the same Table by the mean depression of the dew-point below the temperature of the air, this depression increasing with the dryness of the atmosphere, and therefore usually greatest in spring and summer, though varying from month to month according to the weather. The relative humidity, however, is more exactly given in the fourth column, where “saturation is assumed as 100, and perfectly dry air as zero.” The higher the figures, therefore, in that column, the more nearly the humidity of the air approaches to complete saturation.

Confining ourselves then to this last column, November and December are seen to be the *most humid* months in Bath, then January and February, comprising together the latter part of autumn and the whole season of winter. In spring the humidity lessens considerably, falling in March much below the humidity of February, falling still more in April, and yet lower in May, when it reaches its minimum.* In summer it again increases, in autumn still more so, till it returns to its maximum in the two last months of the year as already stated.

But, as in the case of temperature, it is in reference to other towns compared with Bath that the subject of the humidity of the Bath climate acquires its chief interest. Without knowing what it is in other places we can come to no conclusion as to whether Dr. Tunstall is right or otherwise in considering Bath "not to deserve the character for humidity" it has generally received. I have been at some pains therefore to try and ascertain this point. I could only, however, make a comparison of Bath with those towns and places from which I could get the necessary returns, as published in Glaisher's Tables in the Quarterly Returns of the Registrar-General. It was desirable also to get the results of observations for exactly the same years in all cases. Subject to these conditions I selected the following five places, all lying more or less eastward of Bath and reaching to the east coast, and mostly not, or not very much, north of Bath; viz., Oxford, Greenwich, Camden Town, Royston and Norwich.

The following Table accordingly shows the mean depression of the dew-point, and the mean relative humidity, in each of the above places, along with the same at Bath, in each of the four seasons, derived from the observations of five years, 1866—1870.

* May is on an average probably the driest month in the year, as regards the humidity of the atmosphere, in most parts of the southern half of England. On the 19th of May, 1868, the degree of humidity, at the hottest part of the day, is recorded by Nash to have fallen at Greenwich as low as 29.—*Proceed. Brit. Met. Soc.* vol. iv. p. 196.

SPRING.

	Bath.	Oxford.	Greenwich.	Camden Town.	Royston.	Norwich.
Mean Depression of Dew-point below temp. of air.	6°.9	6°.7	6°.6	7°.7	5°.8	6°.4
Mean Relative Humidity (Sat. = 100).	78	78	78	76	81	80

SUMMER.

	Bath.	Oxford.	Greenwich.	Camden Town.	Royston.	Norwich.
Mean Depression of Dew-point below temp. of air.	6°.9	8°.7	8°.7	9°.0	7°.8	7°.9
Mean Relative Humidity.	79	79	73	73	76	75

AUTUMN.

	Bath.	Oxford.	Greenwich.	Camden Town.	Royston.	Norwich.
Mean Depression of Dew-point below temp. of air.	4°.2	5°.0	4°.7	5°.3	5°.2	5°.0
Mean Relative Humidity.	86	84	84	82	83	83

WINTER.

	Bath.	Oxford.	Greenwich.	Camden Town.	Royston.	Norwich.
Mean Depression of Dew-point, &c.	3°.7	3°.6	4°.2	3°.7	3°.6	3°.2
Mean Relative Humidity.	87	87	85	87	87	88

With respect to the mean depression of the dew-point, it appears from the above Tables that at Bath it is the same in spring and summer, showing however a perceptible difference in both these seasons from what it is in the other towns, the main feature in this difference being—that whilst in spring the mean depression at Bath *exceeds* that of all the other towns except Camden Town, in summer it is *less* than any of the others. This seems to indicate a drier atmosphere at Bath in spring, and a more humid one in summer, though when we look to the mean relative humidity, the former difference disappears in the spring season as regards Oxford and Greenwich, though manifest enough in respect of Royston and Norwich. Camden Town situate in the north of London has a greater depression than Bath in spring by $0^{\circ}.8$, and a less relative humidity, shewing it to be the *driest* of the series at this season, while Royston has the least mean depression, and the highest relative humidity, in the same season showing it to be the *damppest*. Norwich occupies an intermediate place.

In summer the greater humidity of the air in Bath than that of *all* the other towns above specified, is clearly shown, whether we look to the mean depression of the dew-point, or to the mean relative humidity deduced from it.

In autumn we find this humidity increased ;—much in excess of what it is in Bath itself in summer, in the same excess also as before compared with the other towns, especially Camden Town, Royston and Norwich.

In winter there is a still further increase of humidity in the air at Bath, but at this season it is not very different from that of the other towns, with the exception of Greenwich and Norwich, the former of which is less humid than Bath, the latter more so.

The general result of the above, then, seems to be—that Bath is decidedly more humid in summer and autumn than towns lying further to the east, but that in winter and spring, with regard to most of the towns specified in the Table, there is no very material difference.

How is it now with regard to towns lying more to the west? I regret that, in attempting to answer this question, I find very few places from which returns can be had to compare with those of Bath for the same term of years as above, viz., 1866-1870. The only ones I can refer to in the Registrar-General's Quarterly Reports are Taunton, Barnstaple and Truro; the year 1866, however, being omitted in the case of Taunton. Towns lying very close upon the coast I have passed over, proximity to the sea affecting the meteorological conditions of such localities, and putting them on a different footing from towns situated inland.

The following Table, accordingly, gives the mean depression of the dew-point below the temperature of the air, and the mean relative humidity, for each season, during the same term of years as in the previous Table, at each of the three towns above-named.

	Spring.			Summer.		
	Taunton.	Barnstaple	Truro.	Taunton.	Barnstaple	Truro.
Mean Depression of Dew-point.	5°.1	5°.8	5°.3	8°.0	8°.1	6°.8
Mean Humidity.	83	82	82	76	75	78

	Autumn.			Winter.		
	Taunton.	Barnstaple	Truro.	Taunton.	Barnstaple	Truro.
Mean Depression of Dew-point.	4°.5	5°.5	5°.5	2°.6	3°.9	3°.9
Mean Humidity.	86	82	82	89	86	87

Comparing these results with those obtained at Bath during the same years, as seen in the former Table, it is observable that whether we look to the mean depression of the dew-point or to the relative humidity, Bath is seen to be decidedly *less* humid in spring than either Taunton, Barnstaple or Truro, and as decidedly *more* humid in summer than Taunton or Barnstaple, there being no great difference between Bath and Truro at this season.

In autumn the humidity of Bath is about the same as that of Taunton, but in excess of that of Barnstaple and Truro, the humidity of these two last towns being the same at this season.

In winter the humidity of Bath is less than that at Taunton, but not very different from that of Barnstaple and Truro, which are again about the same in this respect.

The up-shot of the whole comparison seems to be that Bath, in relation to other towns whether eastward or westward, is characterised by an excess of humidity during summer and autumn, but by a deficiency of the same, compared with a few other places, in winter and spring.

Looking to Bath alone, the humidity appears to be considerable at all periods of the year; the amount being nearly the same in spring and summer, increasing in autumn, and greatest in winter,—though it is in summer, when combined with a high temperature, that its effects would be most felt. I cannot therefore consider Dr. Tunstall's opinion before alluded to as correct.*

It is this humidity, in connection with the configuration of the ground, which gives rise to the frequent fogs that hang over the

* The humidity of the Bath atmosphere is attested by a passage in Dr. Tunstall's own book, in which he quotes a remark made to him by the late Mr. Lawson, a well-known astronomer, formerly in Lansdown Crescent, that "the atmosphere of Bath was by no means suited to Astronomy." Mr. Lawson added—"There appears to me to be a cloud, or stratum of cloud of little density, always hovering over this locality, which hinders the use of high telescopic powers, and therefore forbids the measurement of close binary stars." See *Climate of Bath*, p.p. 28, 29. I think Mr. Lawson once made a similar remark to myself.

river at the bottom of the town, and which are explained by the air on the hills, when cooled by radiation at night, sliding down into the valley, where it becomes mixed with the moister air below. This causes a depression of the mean temperature of the mixture below its resultant dew-point and fog ensues. The fog will be more or less dense, according as the air in the valley is more or less nearly approaching to saturation before the mixture takes place. Once formed in this way, the fog is further increased by the radiation of heat from its own particles, "water in the liquid state being a good radiant of caloric."*

The appearance of these fogs, as seen from the upper part of the town the following morning a little before sunrise, is that of a mist occupying the lower part of the valley, but separated, if the sky is clear, by a well-defined line from the slopes of the hills above, which stand out as distinct as at other times. After sunrise, the mist is seen slowly rolling upwards in large volumes like smoke, the hills becoming more and more obscured till they are quite hidden from view, the mist being in the end diffused through the atmosphere to a higher or lower elevation according to circumstances. If the sky is clouded or not quite clear, the mist is seen diffused from the beginning, its density being nearly the same everywhere.

Sometimes this mist clears off as the day advances, being taken up with the ascending current of air caused by the increasing temperature of the earth's surface. It then either passes into drier strata higher up and disappears entirely, or collects into *cumuli* (the form of cloud often so noticeable about midday) above the vapour-plain of the cloud region. If the mist is generally diffused at sunrise, with a cloudy sky over head, it may continue through the day, or turns to rain as it happens.

A mist that rises to higher and higher elevations previous to its disappearance, often shows itself on the tops of the hills, after

* Herschell's Meteorology, p. 93.

having left or nearly left the valleys. The late Mr. Weston of Ensleigh, who made his meteorological observations at the same hour, 9 a.m., as those made in the Institution Gardens, once remarked to me how different at that hour it frequently was with him at his elevation of 740 feet above the sea from what it was lower down, the dry-and wet-bulb thermometer indicating saturation, when at the Institution there might be a difference between the two bulbs of that instrument of one, two or more degrees.

In the case of persistent fog through the day, the reverse of this take place, the thick air becoming clearer as we ascend higher. It was a common occurrence, when I lived at Swainswick and walked into Bath in such weather, to find the fog getting thicker and thicker as I approached the town, and sometimes in the town itself passing into actual rain, the rain falling fastest in the lower part of the town near the river,—when at Swainswick perhaps there was little or no rain the whole day.

The fogs above spoken of are most frequent in Bath in the autumn and winter months, when the temperature is low and the relative humidity of the air is at its maximum. They occur, however, at other seasons occasionally, when the atmospheric conditions are favourable for their formation.

I was desirous of ascertaining from the Institution Registers the relative frequency of these fogs in the different months, but as they have not been entered in the Registers in all cases, I have confined myself to marking down the mean number of days in each month on which the dry-and wet-bulb thermometers have been coincident, or within one degree of coincidence, at 9 a.m. *the hour of observation*. Perhaps there is more of interest and utility in such a return than there would be in a return of the mere fogs themselves, as it indicates very exactly that state of humidity, which so far as I have noted is almost always either accompanied by fog, or if no fog by rain, more or less, and so speaks more directly to the character of the climate in this respect.

Also, as the fogs in Bath are mainly due to the river in connec-

tion with the surrounding hills, it is interesting to compare the relative temperature of the air and water at different periods of the year. This we are able to do in the present instance, the temperature of the river at the bottom of the Institution Gardens having been regularly taken each day, at the same hour as the other observations, since October, 1868.

The following Table accordingly gives the mean temperature of the air and of the river for every month in the year, calculated from six years' observations, 1869-1874; along with the mean number of days in each month on which, at 9 a.m., the dry-and wet-bulb thermometers were either coincident or within one degree of coincidence.

Means.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Temperature of Air. }	°	°	°	°	°	°	°	°	°	°	°	°
	41.4	42.3	43.9	50.2	52.3	57.9	63.5	62.1	57.6	50.6	43.4	40.8
Ditto river.	42.1	42.8	45.3	51.4	56.0	62.5	66.1	64.7	59.4	52.6	45.0	41.6
Number of days of Coincidence of dry-and wet-bulbs. }	12.0	7.3	4.6	2.6	2.5	1.2	1.3	3.4	5.2	12.8	12.6	13.9

It will be noted in the above Table, that in every month of the year at 9 a.m. the mean temperature of the river exceeds the mean temperature of the air, the excess being greatest in spring and summer, and least in autumn and winter. It exceeds the mean *night* temperature of the air to a much greater degree. These conditions of atmosphere quite account for the frequency of fogs in Bath,* which originate in the night when, from the difference between the temperatures of the air and water being then greatest, the vapour ascending from the river is more copiously condensed than at other times. After sunrise these temperatures

* Dr. Tunstall says—"Fogs are of very rare occurrence, being seldom seen in the valley of Bath." *Climate of Bath*, p. 55. This statement is not at all in agreement, either with my own observations, or with those of the Institution registers.

approach more nearly to an equality; and in summer, as the day advances, the excess of the river temperature is soon counteracted by the rapid rise of that of the air, causing the fog of the early morn to be speedily taken up and dissipated unless the air is approaching to saturation from other causes, when rain more or less heavy usually ensues.

If we next look to the mean number of days in each month in which the dry-and wet-bulb thermometers are coincident, or within one degree of being so, at the hour of 9 a.m. when the observations are made, we find that number highest in the autumn and winter months, the same seasons in which the fogs preponderate. And these two things usually occur together at such periods of the year; that is to say, if the dry-and wet-bulbs coincide there is generally fog and *vice versa*. In point of fact, however, the fogs are much more numerous than the coincidences of dry-and wet-bulbs *at the above hour* would indicate, the temperature of the air having often by that time risen two or three degrees above the wet-bulb, while the fog is still thick, and such as to prevail a great part of the day.

The coincidences of dry-and wet-bulbs in summer, arising more from humid westerly and south-westerly winds than from nocturnal cold, are almost always either attendant upon rain falling at the time, or followed by rain in the course of the day—sometimes by thunderstorms. This brings us, however, to the subject of the rain-fall which calls for a separate consideration.

Rain.—Of all the elements of climate none is more variable than the rain-fall, the amount differing exceedingly at different places, even confining the remark to our own island. The western counties have a much larger fall than the eastern, from the circumstance of our chief rains coming to us with a south-westerly wind, which in its passage over the Atlantic often becomes saturated or nearly saturated with moisture: the rain-clouds thus formed discharge their contents on the western shores

in the first instance, becoming more and more drained as they advance eastward. The northern counties, too, in a general way have more rain than the southern from the configuration of the ground; the hills and mountains which prevail in Scotland and the north-west of England, intercepting the course of the clouds, and causing much atmospheric disturbance with more frequent rains than occur in those parts of the country where the ground is comparatively but little raised above the sea. The Lake district is well-known as the wettest part of Great Britain the average yearly fall in one place there, the Styne, amounting to 165 inches whereas the average fall in the London district is scarcely more than 25 inches.

Even in the same locality the rain-fall varies greatly in different years, some years having double or more than double the rain-fall of others. Consequently rain measurements require to be continued for a long period in order to determine the true average fall at any particular place. Sometimes the addition of a single year, if either a very wet or a very dry one, seriously disturbs the average as obtained from a decade of years preceding it. Hence the averages given in the following Tables must be received with caution until they have been confirmed or corrected by the observations of a longer period than the ten years to which they relate. Another circumstance also tends to throw doubt on the perfect accuracy of these returns, and that is the position of the rain-gauge in the Institution Gardens. Though the best that could be chosen under the circumstances, it is not wholly unobjectionable. Other buildings besides the Institution itself are very near, and taken together they must prevent, in certain states of wind and weather, some portion of the rain that falls from being received into the gauge. That such is sometimes the case seems to be shown by the fact of a second rain-gauge—placed several years ago for a time on the roof of the Institution—receiving more rain than the one down below in the garden. Making proper allowance for difference of elevation the result should have been just the reverse.

TABLE I. *Rain-fall in each month in each year of the Decade, commencing with March, 1865, and terminating with February, 1875.**

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Totals.
	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
1865	—	—	1.049	0.967	2.049	1.370	9.356	4.771	0.036	5.566	3.804	2.747	25.715
1866	5.374	4.365	1.964	1.743	1.050	3.103	2.084	2.554	6.734	1.546	2.209	3.172	35.878
1867	4.073	2.564	3.968	3.051	1.955	1.376	3.093	2.059	1.837	3.551	0.913	1.416	29.856
1868	4.956	1.689	1.583	2.364	0.701	0.532	0.542	4.342	3.232	2.635	1.891	5.479	29.946
1869	5.068	2.841	1.418	0.932	4.704	1.409	1.057	1.070	4.344	1.987	2.464	3.781	31.075
1870	2.425	1.882	1.189	0.423	2.027	0.757	0.610	1.225	1.258	5.427	2.164	1.595	20.982
1871	2.325	1.335	1.329	3.509	1.095	1.901	5.055	1.131	5.794	1.546	0.700	1.920	27.640
1872	5.204	3.109	2.040	2.692	2.023	3.166	2.202	1.544	3.001	3.714	4.144	4.729	37.568
1873	4.408	1.230	3.521	0.654	1.722	0.931	2.621	3.012	1.285	2.286	2.656	0.564	24.890
1874	3.075	2.185	1.162	1.569	0.479	1.073	0.910	3.445	6.426	3.766	2.021	3.549	29.680
1875	4.200	2.455	—	—	—	—	—	—	—	—	—	—	6.655
Monthly Means.	4.110	2.365	1.922	1.790	1.780	1.561	2.151	2.515	3.394	3.202	2.296	2.895	29.986

* Though the whole period amounts to ten years, of course the measurements under the head of yearly totals, in the cases of 1865 and 1875, have no significance separately considered, but must be added together to make up the tenth year. The same with the next Table (Table II.)

The mean yearly rain-fall at Bath, determined by the results given in the above Table, is 29.986 inches. Allowing for errors, it might probably be set at 30 inches at least if not more.

The wettest year in the decade was 1872, when the fall amounted to 37.568 inches. The driest year was 1870, when the fall was only 20.982 inches, the difference between the two falls amounting to 16.586 inches. These two extremes afford an illustration of what was remarked above as to how an average is affected by the occurrence of either of such extremes in a decade.

If, in calculating the mean rain-fall at Bath from Table I., we omit the exceptionally *dry* year of 1870, the mean is found to be 30.987 inches, or an inch *more* than the mean obtained from the whole ten years. If on the other hand we omit the exceptionally *wet* year of 1872, the mean is found to be 29.144 inches, or between eight and nine tenths of an inch *less* than the mean of the whole ten years.

The next wettest year, after 1872, was 1866—when the fall amounted to 35.878 inches. The next driest, after 1870, was 1873—when the fall was reduced to 24.890 inches. The year approaching nearest to the mean was 1868, only varying from it by .035 inches.

From estimating the mean yearly rain-fall at Bath, we may pass to that of each of the seasons, as well as that of the several months relatively considered. The former is as follows :—

Mean Spring Rain-fall 5.492 inches.

Mean Summer Ditto 6.227 „

Mean Autumn Ditto 8.892 „

Mean Winter Ditto 9.370 „

From this it appears that the rain-fall is least in spring, the fall increasing in summer, with a further increase in autumn, and greatest in winter.

With regard to the several months the mean monthly fall is greatest in January. This month was absolutely the wettest in four years out of the ten, viz., in 1867, 1869, 1872 and 1873.

Also in 1866, though the September fall in that year exceeded the January fall, the latter still amounted to nearly $5\frac{1}{2}$ inches; and again in 1868, though the December fall exceeded that of January, the latter still had very nearly 5 inches.

The driest period of the year at Bath appears on an average to be from March to June, both months inclusive. In no one of these four months does the mean rain-fall amount to 2 inches,—the least fall occurring in June.

The greatest rain-fall in any single month during the decade was 6.734 inches. This was in September, 1866, when rain more or less fell every day in the month except one.

The least rain-fall in any single month was 0.036 inches in September, 1865; there being no single month in the decade absolutely without rain. It may be noticed, though probably a mere accident, that the greatest and least falls both occurred in September.

There are one or two features in the rain-fall of June and July deserving mention. The average fall for these two months combined is 3.712 inches. Whenever the combined fall is in excess of the average, the greater part of the fall is found in the Table to occur in *one* of those two months, and generally in July, instead of both months being equally wet. When the combined rain-fall is below the average, it appears to be pretty equally divided between the two months. There is an exception to this last rule in the year 1873, when the fall in July was more than an inch and a half in excess of the June fall, but then the whole fall was only a very little below the mean.

Passing on to the average autumnal rain-fall at Bath, it is observable that the greater part of the rain at this season falls in the two first months, September having the highest average, October the next highest, and November the lowest average.

There is not much difference between the averages of September and October, but it is worth noting that in most of the years there was a great excess of rain in *one* of these two months above what

fell in the other. In two of the years (1865 and 1866), this excess amounted to more than 5 inches,—indeed in 1865 to more than $5\frac{1}{2}$ inches : in two other years (1870 and 1871) it amounted to more than 4 inches : in two other years (1869 and 1874) to $2\frac{1}{2}$ inches, less in one and more in the other : in the remaining four years the excess varied from $1\frac{1}{2}$ inches or more to rather above half an inch, one of the instances of a very small excess occurring in 1872, the wettest year in the whole decade when much rain fell in every month.

But when we inquire in which of the two months, September or October, this excess of rain usually takes place,—we find it equally divided between the two ; there being in the decade exactly five years in which September had the excess, and five in which October had it. The conclusion seems to be that, on an average, one of the two months of September and October is comparatively speaking a wet one, and the other a dry one. But which is to be wet and which dry is an even chance looking merely to returns.

TABLE II. *No. of Rainy Days, or on which not less rain fell than 0.01 inc., in each month in each year of the Decade, commencing with March, 1865, and terminating with February, 1875.*

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Totals.
1865	—	—	12	9	16	4	10	18	2	17	21	13	122
1866	25	20	14	14	9	16	9	18	29	13	16	17	200
1867	16	14	18	20	10	7	15	8	12	24	5	13	162
1868	10	10	12	10	8	5	7	16	11	12	10	26	146
1869	15	18	12	9	20	9	9	7	19	12	15	17	168
1870	15	13	8	2	8	2	7	5	10	19	12	12	113
1871	17	15	10	18	4	13	21	6	13	13	7	13	150
1872	25	22	13	9	17	18	10	15	19	19	20	23	210
1873	19	12	15	7	11	8	15	19	12	15	14	8	155
1874	17	14	13	13	8	7	10	16	20	17	11	11	157
1875	22	10	—	—	—	—	—	—	—	—	—	—	32
Means.	19	14.8	12.7	11.1	11.1	8.9	11.3	12.8	14.7	16.1	13.1	15.3	160.9

The above Table shows the average number of wet days in Bath, or days on which rain falls to the amount of not less than one hundredth of an inch, to be about 161. If we included the days on which the amount is too small to be measured, it would certainly exceed one half the number of days in the year.* It must be remembered, however, that a day of twenty-four hours is here meant, and that much of the rain falls during the night;—the fine days, therefore, as ordinarily estimated would amount to many more than the above calculation gives.

The greatest number of days on which rain fell in any one year in the above Table was 210, in 1872. The least number of days in any one year was 113 in 1870.

The month with the highest average number of rainy days is January, the number being nineteen. The month with the lowest average number is June, the number being 8.9.

The greatest number of rainy days in any single month during the decade was twenty-nine, in September, 1866. The least number in any single month was two, occurring in September 1865, April 1870, and June 1870.

In the above instances, the months with the greatest and least number of rainy days coincide with the months of greatest and least rain-fall. This perhaps might be expected; yet the coincidence is not a necessary one, as an equal quantity of rain may fall in one or a few days or be distributed over many days. Thus in May, 1870, the rainfall was the same as in May, 1872, within .004 inches, but the number of rainy days in the latter month was more than double the number in May, 1870. We have the converse of this phenomenon in the month of January, 1869, compared with January in the following year: the number of rainy days was exactly the same in the two months; but the rainfall of January, 1869, was more than double the fall in January, 1870.

* Howard says that "in our climate, on an average of years, it rains nearly every other day more or less."—*Climate of London*.

Generally speaking, the heaviest falls of rain occur in the summer months, in the form of storms and hard showers which, comparatively speaking, are not of long duration. In the winter the rains are more frequent and more continuous, and they fall more equably. There is a difference however in this respect between the west and the east of England, which calls for further remark.

As far as my observation goes, heavy falls of rain in Bath, of short duration, are not equal to the falls which sometimes occur in the Eastern Counties and in the neighbourhood of London. In Cambridgeshire formerly, I measured on two or three occasions a fall of considerably more than two inches, attendant upon thunder-storms, within a very few hours: such a fall in one instance occurred within the period of two hours. A fall of rain that took place on July 26th, 1867, in the south-east part of England is recorded to have been 3.67 inches.* In London and the suburbs, during a thunder-storm on the 1st August, 1864, "rain mixt with hail is said to have fallen to the amount of 4 inches in three hours."† No such falls of rain as these have ever been measured in Bath to my knowledge. Even the greatest fall in twenty-four hours probably as a rule does not exceed an inch and a half.‡ During the ten years ending with February, 1875, the Registers of the Literary Institution show only three instances in which the greatest fall in twenty-four hours has made an approach to that quantity. In two of the years the greatest fall was less than an inch, whilst in three others it was very little more than an inch.

This perhaps might be expected from the difference in the

* *Proceed. Brit. Met. Soc.* vol. iv., p. 208.

† *Id.* vol. i, p. 179.

‡ The above was written previous to the very wet July of last year, 1875, when, on the 14th day of that month, there fell in the Institution Gardens, within the twenty-four hours, the exceptionally large amount of 2.750 inches.

climates of the west and east of England. Though the mean annual rainfall at Bath exceeds the fall in Cambridgeshire by seven inches or more, this is due to the greater number of wet days, and the rain falling more frequently—not to its falling more heavily on particular occasions. At Bath, as shown above, a great proportion of the rain falls in winter, which is generally the wettest season.

In Cambridgeshire, on the contrary, this season is comparatively dry, the chief rains falling in summer and autumn, and oftenest in the character of heavy storms at intervals, these being the occasions on which occur the greatest falls in short periods of time.

The atmosphere also in summer, or that portion of it below the cloud-region, is more humid in the Western Counties than it is in the Eastern Counties; from which arises another circumstance, viz., that, as a rule, thunder-storms in Bath are not only less frequent than in Cambridgeshire but less intense, the excess of moisture in the air often serving to carry off, without any violent discharge, the electricity that would otherwise collect overhead. Even when thunder-storms have been exceptionally heavy in Bath, as the one that occurred in the night of July 22-23, 1873, the accompanying rain-fall has not been at all excessive, the rain measured at the Institution on the occasion just mentioned having been under half an inch.

It is further noticeable that the thunder-storms which occur in this neighbourhood, as they approach Bath and come into collision with the hills which everywhere surround the city except to the west, often pass to one side or else divide into two portions leading off to the right and left respectively, so that a storm passing directly over the city is a rare thing. I remember very few instances, during a residence of five-and-twenty years, in which this has been the case.

When speaking above of heavy falls of rain in short periods of time consideration was had simply to the *absolute* quantity of rain fallen on such occasions. But we get a better idea of the amount

of such falls when considered in connection with the mean yearly fall. Mr. Symons, taking a general survey of the results of rain-fall measurements in Great Britain, finds a marked relationship between the maximum falls of rain in twenty-four hours and the mean yearly total. The former being estimated at a per-centage of the latter, the ratio between these two quantities is found to be much higher at the eastern stations than at the western, the heaviest falls in the western stations being "relatively hardly half as large as in the eastern." The western stations, however, "in point of quantity," still "maintain their excess as well in individual falls as in the yearly totals." He remarks that the "wet stations never have more than 5 per-cent. of their yearly fall in twenty-four hours, whereas the dry stations often have 10 per-cent., and sometimes 13, 14, or 15 per-cent.;" and he states, in explanation of the circumstance, that "the rain-fall at the western stations is more uniform in its distribution than at the eastern ones, where the fall is, so to speak, more spasmodic."*

This agrees with what has been above stated. Nor is it really contradictory to what was said respecting the heavier falls in Cambridgeshire than in Bath on the occasion of storms which last only a few hours. When we take the case of ordinary rains falling continuously for a day or more—no uncommon thing in Bath—there can be no question as to the larger amount of rain falling here than in Cambridgeshire during the twenty-four hours, though even in this case the quantity would be less when estimated as a per-centage of the whole yearly fall. In truth, in Cambridgeshire it is a rare thing for the rain to continue the whole day long. On the occasion of the most exceptionally long continued rain I ever remember in that part of England, which took place on the 30th and 31st of August, 1833, lasting for forty-eight hours, the quantity that fell was rather more than two inches, being not quite 9 per-cent. of the yearly total. Instances, however, are not

* Symons' *British Rainfall*, 1864, p. 28. Id. 1867, p. 79.

unfrequent in Bath, in which, as before stated, the quantity falling in twenty-four hours, or only half the above time, has amounted to an inch or more, the same being less than $4\frac{1}{2}$ per-cent. of the yearly total.

I may add further, while comparing the rain-falls in the Western and Eastern Counties, that the seasonal differences in the quantity of rain on the two opposite sides of England tend to confirm a law suggested by Mr. Gaster,* viz., that the greater the yearly average quantity of rain at any place the later in the year occurs the greatest monthly per-centage.

The rain-fall in Bath, as already stated, is greatest in winter and least in spring, the summer-fall being only a slight increase upon the spring fall, while the increase of the autumn fall upon the summer fall is very considerable.

In Cambridgeshire, on the contrary, the rain-fall is greatest in autumn, but so little in excess of the summer fall, that if measured for a long term of years there is reason to believe the rain-fall for these two seasons might prove to be the same; while the winter and spring falls, (which in Bath are the extremes of wet and dry respectively), are not very different from each other.

The rainfall at Bath may now be compared with that of other places in the west of England. First with the neighbourhood of Torquay: Mr. Pengelly has published a statement of the "rain-fall in the St. Mary Church Road, Torquay, during the nine years ending with December 31st, 1872,"† all which years, except the first, fall within the series of years in the Table given at p. 254, though the latter series extend two years beyond 1872.

The average yearly rain-fall at St. Mary Church Road is 37.65 inches, being more than $7\frac{1}{2}$ inches above the Bath rain-fall, and about equal to what fell in Bath in 1872, the wettest year in the

* British Rainfall, 1867, p. 33.

† Transactions of Devonshire Association for the Advancement of Science, &c., 1873.

Bath series. The fall at St. Mary Church in 1872, likewise the wettest year in the series in that locality, was 48.61 inches, or more than 11 inches in excess of the Bath fall that same year. With respect to the average rain-fall in the several seasons at St. Mary Church, the spring, autumn and winter falls all show a proportional increase upon those at Bath, but it is remarkable that the average summer rain-fall is nearly an inch *less* than at Bath, the deficiency showing itself especially in the month of August. From this circumstance it would seem that summer is the driest season at St. Mary Church, and not spring as in Bath. The autumn rain-fall is more than double the summer fall; the winter season, however, being the wettest of all—as at Bath.

During the nine years, 1864-1872, the three wettest consecutive months at St. Mary Church, in four out of the nine years, proved to be January, February, and March; in four other years, October, November, and December were the three wettest consecutive months; in the one remaining year, September, October, and November.

At Bath, during the nine years, 1866-1874, the three wettest consecutive months, were found also, in four out of the nine years, to be January, February, and March; in two of the years, October, November, and December were the three wettest consecutive months; in two other years, August, September, and October; in the one remaining year, July, August, and September.

The fact of the two summer months of July and August being two out of the three wettest consecutive months at Bath in this last instance, these months not appearing under this character in any of the nine years at St. Mary Church, is in accordance with what was said above as to the average summer rain-fall being so much less at St. Mary Church than at Bath. And this is further confirmed by July and August being set down in Mr. Pengelly's returns as, in *four* years out of the nine, two of the three *driest* consecutive months. At Bath they only so appear in *two* out of the nine years.

Mr. Pengelly has recorded the average number of wet days in each month at St. Mary Church during the same nine years. These averages are not more in excess of the Bath averages than might be expected from the increased quantity of rain at St. Mary Church, and the relationship between the several months in this particular is much about the same. The chief difference appears in the months of February and March, which seem to be wetter, relatively considered, at St. Mary Church than at Bath. The yearly average number of wet days at St. Mary Church exceeds the yearly average at Bath by twenty-two.

The greatest fall in twenty-four hours during the nine years was 2.13 inches. The average greatest fall in twenty-four hours is 1.52 inches. This last does not much exceed the average greatest fall in twenty-four hours in Bath.

Taking next into consideration the rain-fall at Exeter, Dr. Shapter, in his work before alluded to, sets the yearly average there, from the measurements of forty-four years, 1817-1868, at twenty-nine inches. This is nearly one inch less than the yearly average at Bath. But, as is the case in other places, he states that the amount varies much in different years, the maximum and minimum yearly falls during the above period being 42.5 inches and eighteen inches respectively. The difference between these two measurements, or the range of the yearly fall, amounting to 24.5 inches, very much exceeds the range of the same fall at Bath, which is under seventeen inches, though the Bath extremes would probably approximate more closely to those at Exeter, were the Bath rain measurements continued for as long a term of years.

Dr. Shapter states the autumn to be the wettest season at Exeter, and November the wettest month. This is not the case in Bath, where, though the autumn rains as a whole are, in amount, not very much less than the winter rains, the wettest month in particular is decidedly January. The driest month at Exeter he states to be July; at Bath it is June, as at present determined;

but the differences between the rain-fall of this month and that of May, and that of July as well, at neither place perhaps are sufficiently great not to leave ground for belief that any one of these three months might prove to be the driest after a long period of measurement.

Dr. Shapter speaks of "snow as not of frequent occurrence at Exeter, and when it does occur, it rarely falls," he says, "in any great quantity, or remains on the ground above two or three days, excepting on the high lands of the district." This remark applies equally to snow at Bath, to which I have not before alluded.

He also says that "thunder and lightning are comparatively unfrequent, and that only very rarely the storms are attended by serious or awful consequences." I have already spoken of the thunder-storms at Bath, where the case is much the same as at Exeter.

The mean yearly rain-fall at Clifton, from the measurements of ten years, 1853-1862, at the elevation of 228 feet above the sea-level, is stated by Dr. Burder to be 31.020 inches, exceeding the Bath average by more than an inch.—As the above decade of years is quite a distinct one from the Bath decade, it might have been supposed that the surplusage was in part attributable to this circumstance.—In a work, however, recently published,* in which rain-fall measurements at Clifton are said to have been carried on in continuation of Dr. Burder's to the present time, or for "twenty-two years ending with 1874," the mean yearly fall is set at 32.194 inches; or more than *two inches* above the Bath average. From this we might infer that Clifton is wetter than Bath; but it is not at all improbable that the result would be very different were the rain-fall measured at *both* places for an equally long term of years, and for the *same* years. As it stands now the excess of rain at Clifton is greater in all the months except January, February,

* *Bristol and its Environs*.—See pp. 383-395 for the Meteorology of Clifton.

September, and December, and is greatest in May, and in the three summer months of June, July, and August.

I would now speak of the rain-fall at a few other places—in Bath and the neighbourhood—for comparison with that at the Literary Institution. The rain-fall in the Paragon was measured by Mr. Barter for a period of nineteen years, commencing with 1855 and ending with 1873 : height of the gauge above the sea-level, 113 feet.—The mean yearly fall as determined by these measurements is 34.11 inches ; being more than *four inches* in excess of the mean yearly fall at the Institution as given above. The greater part of this excess seems due to the circumstance of the first half of the above period,—*previous* to the year in which the Institution Registers commenced,—being a much wetter period than that which succeeded. For if the measurements at the Paragon and those at the Institution be compared for eight years, the same identical years in both cases, 1866-1873, whereby we get a more fair comparison, the excess is reduced to little more than *one inch*, which difference may be a constant one, supposing, however, that no part of this is due to the gauge at the Institution failing, in consequence of its position, to receive all the rain that falls, as before suggested.* Any how it shows the necessity of measuring the rain for long periods of time in order to get a true approximation to the mean yearly fall.

The rain-fall at the Batheaston Reservoirs has been measured for many years back by Mr. Alfred Mitchell, the City Engineer. The Reservoirs are 226 feet above the sea-level, and 151 feet above the gauge at the Institution. The mean yearly fall at the Reservoirs from the measurements of 12 years, 1862—1873, is 28.34 inches : the mean at the Paragon for the *same twelve years*, is 31.66 inches, being 3.32 inches more.

The rain-fall at Weston has been measured by Mr. Bush for the last eleven years (1864—1874) ; the height of the gauge above

* p. 253.

the sea-level being 198 feet.* The mean yearly fall for those eleven years is 29.75 inches.

If now, for the sake of better comparison between the several places above mentioned, including the Literary Institution,—we take the mean yearly rain-fall at each of them for the eight years, commencing with 1866 and ending with 1873,—the only period for which they can be all compared together,—the result is as follows :—

<i>Height above sea.</i>		<i>Mean yearly Rain-fall.</i>	
113	... Paragon ...	...	30.75 Inc.
198	... Weston ...	...	30.32 „
75	... Literary Institution ...	...	29.73 „
226	... Batheaston Reservoirs ...	...	29.64 „

I have given in each case the height above the sea as it adds to the value of the comparison ; and it will be seen that in the case of these particular localities there appears no marked relationship between the height and the rain-fall. The difference in height between the Institution and the Reservoirs is more than 150 feet, with only a difference of .09 inches in the rain-fall.

The rain-fall at Upper Swainswick was measured by the late Mr. Frederick Lockey for a period of thirty years, 1834—1863. The gauge was at the height of about 32 feet above the ground and at an estimated height of 350 feet above the Avon. The average yearly fall as determined by his registers is 25.86 inches. The wettest years in the series are 1839, when the fall was 33.08 inc.,—1848, with a fall of 34.38 inc., and 1852, when the fall reached to 42.64 inc. In this last year the fall in the month of November was 8.32 inc., being the greatest quantity of rain in any one month during the thirty years. The driest years in the series are 1840,

* The yearly rain-fall measurements at the above three places—Weston, the Batheaston Reservoirs, and the Paragon, have been taken from Symons' "British Rain-fall ;" those relating to the Paragon in connection with Mr. Barter's "Sanitary conditions of Bath," p. 5.

with a fall of 20.72 inc.,—1844, with a fall of 20.67 inc.,—1854, with a fall of 18.58 inc., and 1858, with a fall of 18.84 inches. The difference in the rain-fall between the wettest year (1852) and the driest (1854) is more than 24 inches.

I gave some particulars respecting the rain-fall at Swainswick, as determined by Mr. Lockey's measurements, in the paper I read to the British Association at the Bath meeting in 1864.* I there stated that the average yearly rain-fall at Swainswick was less than that at Bath by six inches or more.—The observations at the Literary Institution had not at that time been commenced ;—and I was indebted to Mr. Biggs for the return of the Bath average, which he set at 31.97 inches, the result of twenty years' measurement, 1842-1861. These twenty years fall within the thirty years of Mr. Lockey's measurements, and it is quite possible that Mr. Biggs's return may be correct for that period, though very nearly two inches in excess of the average resulting from the measurements at the Literary Institution for the decade commencing with 1865 ;—so great is the variation of the rain-fall when measured over different periods of years.

Mr. Lockey's Registers give the fall for each month in each year, by which it appears that autumn is the wettest season, and October the wettest month in the year at Swainswick, the driest season being winter. This is very different from Bath, where winter is the wettest season ; and the difference is due perhaps to the circumstance of the yearly totals at the two places being so different, and in agreement with the law above alluded to† respecting the wettest months, as occurring later in the year according as the yearly total increases.

But it is a question of much interest why the rain-fall at Swainswick should be so much less than at Bath, the distance between the two places being only two miles ?—If we take Mr.

* See the *Bath Chronicle* Report of that meeting, p. 109.

† p. 262.

Barter's return for the Paragon, (19 years,) for comparison with Mr. Lockey's, the former shows an excess of rain at Bath of more than *eight inches*. Mr. Biggs's return, however, which reduces the excess to less than two inches, is perhaps better for comparison here as the period of years (twenty) synchronizes better with Mr. Lockey's period. Still the question remains; and of course we should at first be disposed to attribute the circumstance to difference of elevation. But this is not in itself sufficient to account for it. For the Reservoirs at Batheaston are three times higher above the sea than the Institution Gardens, with a difference in the rain-fall at the two places, as before stated, of only .09 inc., while Swainswick is not more than 174 feet above the Reservoirs, and yet there is nearly the same difference in the rain-fall between Swainswick and the Reservoirs as there is between Swainswick and the Institution.

I should rather be disposed to attribute the circumstance to the configuration of the surrounding country. Were a rain-gauge artificially fixed at the elevation of a few hundred feet, in a flat country, it would undoubtedly collect considerably less rain than one on the ground, while other gauges, fixed at intermediate heights, would collect in proportion to their heights. But these results are much interfered with when we take the case of elevation, as at Swainswick, arising from elevation of the ground itself, with a great variety of features in the surrounding district. Swainswick Cottage, where Mr. Lockey's observations were made, is on the slope of a hill inclining down to Bath, forming part of a chain of hills almost surrounding the city, with valleys intersecting in different directions; the river, at the bottom, running close to the Institution Gardens, in which the Institution gauge is placed, and always exhaling more or less vapour into the atmosphere above. These conditions of country are quite sufficient to disarrange the ordinary effects of elevation in lessening the rain-fall. And where they prevail on a large scale, with hills or mountains rising to a great height, as in the Lake

District, we know that the rain-fall, instead of being lessened by elevation, is sometimes enormously increased. Even on Lansdown, the highest ground we have about Bath, the quantity of rain would seem to be sometimes greater than at the Institution. But this circumstance will be further spoken of presently, when I come to mention the late Mr. Weston's observations at Ensheigh.

Mr. Lockey's register gives a return of the yearly number of wet days for the first nineteen years of his series of rain measurements, 1834—1852, the average number being 185. The mean rain-fall at Swainswick for the same nineteen years is 26.75 inches. If we compare this relationship of wet days to rain-fall with the Institution returns for the ten years 1865—1874, we find it reversed in this last instance; the yearly average number of wet days at the Institution being only 161, with a rain fall exceeding that at Swainswick by more than three inches. In fact, the average number of wet days at Swainswick even exceeds the number at Torquay, according to Mr. Pengelly's return. But this relationship seems to vary much in different years in Mr. Lockey's own register, in which we find a greater number of wet days in the years 1841 and 1848, in which the total rain-fall was 29.54 inches, and 34.38 inches respectively, than in the year 1852, in which the rain-fall reached the large amount of 42.64 inches. Still, it may be that the rains at Swainswick, on an average, are lighter and more frequent than at the Institution, so as to explain the above discrepancy.

From the rain-fall at Swainswick, we may pass to that at Oakwood, on Bathwick hill, with which it is interesting to compare it; the two places being much about the same altitude above the sea. While Swainswick is two miles north of Bath, Oakwood is nearly the same distance east of it. The rain-fall at Oakwood was measured by Mr. Dobson for eight years, 1858—1865, the average fall, as deduced from those years, being 27.830 inches. The first six of these years admit of comparison with Mr. Lockey's register; the average fall for those years being at Oakwood 28.616 inches,

at Swainswick 24.743 inches. Thus there is an excess of rain at Oakwood, compared with Swainswick, amounting on an average to 3.873 inches, but varying in different years from 1.20 inches to as much as 7.285 inches; the greatest excess appearing in those years, in which the total quantity of rain is the largest. And so we have here another instance of considerable difference of rainfall in two places, only a few miles apart, clearly independent of height above the sea. Probably, in the present case, the increased fall at Oakwood above Swainswick is traceable, at least in part, to the woods in the immediate neighbourhood.

Observations on Lansdown.—The different parts of Bath itself being at very different elevations, I always thought it would be desirable to compare the meteorological conditions of the lower parts of the town near the river with those of the highest inhabited parts of Lansdown, these conditions being determined by contemporaneous observations at the two places.—A Register was formerly kept at Ensleigh (the height of which above the sea is 740 feet), by the late Charles Weston, Esq., the well-known astronomer; but for some years before his death the register had been discontinued. There are three years, however, or rather 33 months, commencing with July, 1865, and ending with June, 1868 (the observations for April, 1866, and those for January and March, 1867, being deficient), during which period the register runs parallel with that kept at the Literary Institution.—I have accordingly closely compared these registers for the period in question, omitting the same months in the examination of the Institution register that are omitted in the Ensleigh register, in order more strictly to preserve the parallelism between them. Though three years' observations would be very insufficient for determining the absolute climate of any particular locality, they serve to indicate its relative character compared with another locality not far distant; the general conditions of the weather and seasons during that period being the same for both.—The

observations relate to temperature, the dew-point and humidity of the atmosphere, the rain-fall, and the number of days on which rain fell more or less.

The results are not without interest. With regard to the temperature of the air, the mean temperature of every one of the 33 months, with the single exception of January, 1868, is lower at Ensleigh than at the Institution, the mean difference for the whole period being $2^{\circ}.9$, making Ensleigh to be nearly three degrees colder than the Institution Gardens. This difference prevails equally in the summer and in the winter months. And not only is the *mean* temperature for the period in question lower at Ensleigh, but the *maximum and minimum* temperatures are likewise lower.

The mean of all the *maxima* at Ensleigh is lower in each of the several months except four. In three of the excepted months it is the same at both places. In one instance alone it is higher at Ensleigh than at the Institution. There is, however, a greater difference in this respect in the *winter* months than in the summer. In summer the difference is very small, the mean of all the *maxima* at Ensleigh being at this season only three-tenths of a degree lower than at the Institution. In winter this difference amounts to $1^{\circ}.3$.

The mean of all the *minima* is lower at Ensleigh than at the Institution in every month except two; in one of the excepted months it is equal at the two places; in the other (this being also the only instance) it is higher at Ensleigh. And it is observable with regard to *this* mean, that there is no material difference between summer and winter, the difference for summer being $2^{\circ}.4$, for winter, $2^{\circ}.7$; *i.e.*, the night temperature at Ensleigh falls as much below the night temperature at the Institution at one season as the other, the difference in both cases being nearly as much again as the difference between the means of the highest day temperatures at the two places even in winter.

Taking all the seasons together, the mean daily range of the

thermometer at Ensleigh, during the three years for which the joint registers run parallel, is exactly one degree and a half in excess of what it is at the Institution, owing chiefly, as shown above, to the greater depression of the night temperature at the former place.

The mean temperature of the dew-point also, like that of the air, except in a very few instances, is lower at Ensleigh than at the Institution, the mean difference for the whole period being nearly two degrees. But the *mean depression of the dew-point below the temperature of the air*, which is of more importance as more directly connected with the humidity of the atmosphere, is less than at the Institution, showing that, notwithstanding a lower dew-point, the humidity more nearly approaches the saturation point.

This, perhaps, is not what some persons would expect, that there should seem to be more vapour in the air upon the hills, than in the valleys by the river-side. But it is the *relative*, not the *absolute*, humidity of the air which is here spoken of, the difference between which has been already explained. And in reference to the circumstance itself it may be remarked that though the valleys during the night and early part of the day, in particular states of weather, are often full of mist—the mist reaching up the hills to a certain height while the tops of the hills are clear—these mists, as the day advances and the sun acquires more power, are gradually taken up by the atmosphere, and pass into the form of invisible vapour, which keeps continually ascending till it reaches the vapour-plane or cloud-region. The quantity of moisture in the air, therefore, will *increase* in proportion to the altitude, while the temperature of the air will *lessen* in proportion to the altitude; and hence arises the circumstance of the difference between the temperature of the dew-point and the temperature of the air being less at Ensleigh than at the Institution. Such is, moreover, in accordance with what has been observed by meteorologists who have made balloon ascents. Mr. Welsh in each of four such

ascents found the humidity of the air "to increase till reaching the first stratum of clouds, afterwards to vary irregularly."* Mr. Glaisher likewise, in working out the results of several of his balloon ascents, found "that the temperature of the dew-point decreased, on leaving the earth, less rapidly than the temperature of the air; so that the difference between the two temperatures became less and less, till the vapour-plane was reached, when they were usually together."†

Another notable circumstance in the results is the larger quantity of rain that fell at Ensleigh than in the Institution Gardens, during the above thirty-three months. This circumstance was alluded to above.‡ The whole excess is about an inch and a half; the excess being most remarkable in the year 1866, in which it amounted to more than five inches, showing itself in every month of that particular year, except June and September. This difference is not easily accounted for, the elevation of Ensleigh being so very much greater than the low parts of the town, and the quantity of rain generally diminishing with the altitude. This rule, however, which applies to different elevations above a level plain, does not, as before stated, necessarily hold good in the case of differences of height, due to hills and valleys. At the same time it is observable, with reference to the present instance, that the mean rain-fall at Swainswick, as given above from the measurements of the late Mr. Lockey, is under 26 inches; the height above the sea being about 400 feet, and the distance from Ensleigh, in a direct line, being very inconsiderable. The fall at the two respective places during the particular years of 1865-68 cannot be ascertained, as Mr. Lockey's register terminates previous to that period. On the whole, I am inclined to consider the anomaly as due in part to elevation, in connection with the configuration of the surrounding country; in part also to the rain measurements at the Institution being under mark, from the

* Phil. Trans., 1853, p. 311. † Proceed. of Brit. Meteorol. Soc., vol. 1, p. 259. ‡ p. 270.

unavoidable conditions of the spot where the gauge is fixed, the surrounding buildings intercepting a certain quantity from being received into it.

It may be convenient for future reference to tabulate the above results of the comparative observations at Ensleigh and the Institution Gardens, as under :—

Results of three years' Comparative Observations.

	Ensleigh.	Institution.
Mean Temperature of the air	48°.7 —	— 51°.6
Mean of all the Maxima	57°.1 —	— 58°.0
Mean of all the Minima	41°.5 —	— 43°.9
Mean Daily Range of Temperature .	15°.6 —	— 14°.1
Mean Temperature of the Dew-point .	44°.9 —	— 46°.8
Mean Depression of the Dew-point below the temperature of the air	3°.8 —	— 4°.8
Rain-fall :—whole amount collected during 33 months	91.4 inc.	— 89.8 inc.
No. of days on which rain fell during the whole period	438 —	— 460

It was necessary to work out these details with closeness in order to get if it were only an approximation to the true conditions of climate on the hills round Bath as compared with the bottom of the town, the period of the contemporaneity of the observations, by which those conditions had to be estimated, being so limited. And I think they are sufficient to establish this conclusion, that, irrespective of any difference in the *quality* of the air, of which more presently, the hills are most to be recommended for summer residence, the high temperatures at that season not being greater, or indeed very different from what they are in the town, while the mean temperature is less ; but that the town is to be preferred in winter as both warmer and drier at that period of the year, with a more limited range of temperature,—the night

temperatures especially not falling so low as on the hills, a matter of considerable importance to certain classes of invalids.

This may have been often assumed to be the case before, but I do not believe it has ever been put to the proof, or shown to be sustained by the results of any comparative observations, made contemporaneously in the town and on the hills above.

And if the results above stated, referring as they do to the highest ground in the immediate neighbourhood of Bath compared with the Institution Gardens, be correct—and there is no doubt of the correctness of Mr. Weston's observations, upon which they are based, so far as they go—then we may fairly estimate the climate at any elevation between those two extremes as of an intermediate character according to what the particular height may be. For the present, however, it can be only an estimation, as I know of no continued observations other than the above which can be appealed to in reference to other heights, none at least carried on contemporaneously with the above.

Other Observations in or near Bath.—Though not comparable with those just alluded to, it may be desirable, nevertheless, here to place on record a few other observations relating to temperature made by different parties in, or in the immediate neighbourhood of, the town. Mr. Lockey, of Swainswick, made no observations on the temperature of that locality, confining himself entirely, as far as I am aware, to the rain-fall of which I have already spoken. During my own residence at Swainswick, from 1852 to 1860, I kept a register of the thermometer, attending also to a few other matters connected with weather changes; but the register was often interrupted in consequence of leaving home, and had it been continuous, there was no other kept elsewhere at that time that I know of with which to compare it.

I kept a more connected register at Darlington Place, on Bathwick hill, the estimated height being about 90 feet above the Institution Gardens. This register commences with December, 1862, and ends with July, 1869. Even here there are several

months in which the observations are deficient, but as during some part of the period the register runs parallel with the one at the Institution, it may be useful to compare the two, leaving out of consideration, as in the case of the Ensleigh register, those months in which observations were not made at *both* places.

The result of the comparison is as follows:—The mean winter temperature at Darlington Place is $0^{\circ}.7$ lower, and the mean summer temperature $1^{\circ}.6$ lower, than at the Institution. In that extremely hot month, July 1868, the hottest that has occurred since the commencement of the Institution registers, the mean temperature at Darlington Place was $2^{\circ}.6$ lower than in the Institution Gardens: hence Darlington Place has the advantage over that part of the town in summer in being cooler,—the difference probably increasing as the heat increases;—while the town has the advantage in winter in being slightly the warmer of the two localities. It is noteworthy also that the difference in the mean temperature between Darlington Place and the Institution in winter for the period in question is found to be exactly the same in each of the three months of December, January, and February, which together make up the winter season, leading to the belief that the difference as above stated is pretty constant.

With regard to the highest and lowest temperatures, taking all the seasons together, the mean maximum at Darlington Place is $0^{\circ}.5$ lower than at the Institution, and the mean minimum $0^{\circ}.5$ higher. The mean daily range, therefore, is $1^{\circ}.0$ less at Darlington Place than at the Institution Gardens.

The above results seem to accord in a general way with the results of the Ensleigh observations, the differences noticeable being probably due to the greater elevation of Ensleigh above the river.

Four years' observations in Belmont since those in Darlington Place, viz., 1870, 1871, 1872, 1873, compared with the Institution registers for the same years, yield very similar results to those obtained in Darlington Place, the mean temperature, all seasons

included, being about one degree lower than at the Institution. The mean daily range is also nearly one degree less, neither the maxima rising so high on an average, especially in summer, nor the minima falling so low, as in the Institution Gardens. The elevation of Belmont above the river, and that of Darlington Place, are believed to be nearly the same.

A register of the temperature was kept in the Circus for four years, commencing with 1858 and ending with 1861, by Sir Vansittart Stonehouse, a resident in Bath at that time, the results of which, with his kind permission, I stated in the paper I read to the British Association at the meeting in Bath in 1864.* I mentioned on that occasion that I thought the averages as deduced from his registers were too low, "due partly to the position of the instrument used, and partly to the short term of years for which the observations had been made." And this appears confirmed on comparison with the averages obtained at the Institution as before given, which are notably higher, and though not relating to the same years, they relate to a longer term of years, and are so far more worthy of confidence.—In exemplification, the mean temperatures of the four seasons respectively, as obtained in the Circus and in the Institution Gardens, are placed side by side in the following table.

		<i>Circus.</i>	<i>Institution.</i>
Mean Temperature of Spring	...	48°.0	... 48°.5
" Summer	...	60.0	... 61.2
" Autumn	...	50.0	... 50.8
" Winter	...	40.0	... 41.7
Mean of the whole year	...	49.5	... 50.5

A register more complete in every way than that of Sir Vansittart Stonehouse has for many years back been kept in the Paragon by Mr. C. S. Barter, in connection with sanitary enquiries. In his "Report on the Sanitary Condition of the City and

* See *Bath Chronicle* report of that meeting, p. 108.

Borough of Bath during the years 1867-1868" (p. 3), he has tabulated the results of barometric and thermometric observations carried on in the above locality for a series of eighteen years, commencing with 1849 and ending with 1866. This register is not comparable with the one at the Institution except for the last year, but it is valuable as giving us the meteorology of Bath over a considerable period of time anterior to the commencement of the Institution register, the two together forming a continuous register, though carried on in different localities. It is curious also to notice, notwithstanding the circumstance last mentioned, that the mean temperature of the above eighteen years is stated to be $50^{\circ}.5$, being *exactly the same* as the mean of the subsequent years, deduced from the Institution observations.—That the two means would not be always the same in particular years is shown by Mr. Barter's registers for the years 1866, 1867, and 1868, the two latter being given separately at pp. 55 and 73. In the first of these years, 1866, Mr. Barter's mean is no less than $2^{\circ}.7$ *higher* than the Institution mean: in 1867 it is $2^{\circ}.0$ higher, in 1868 the difference is further reduced, but it is still $1^{\circ}.3$ in excess.

This is not what we might expect, nor in accordance with the results of registers kept in other places, before alluded to, which all lead to the inference that the Institution Gardens have a slightly higher mean temperature than those parts of the town which are more elevated above the river. Further comparison, therefore, is necessary to explain the anomaly, which may possibly be due to the circumstances under which the instrument in the Paragon is placed.* From whatever cause it arises the anomaly shows itself

* The great care required in fixing a thermometer so that it shall not be influenced by contiguous buildings was remarkably shown by some comparative observations of my own in Darlington Place during the hot summer of 1868. On the morning of the 23rd of July, at 9 a.m.—the previous day having been extremely hot with a maximum temperature of 91° and all walls necessarily much heated,—a thermometer at my hall window, though hanging quite free from the wall and on which the sun itself never came, was 75° , another

in the mean temperature alone. With regard to the maximum and minimum temperatures, the results here are similar to those obtained in other places, the mean daily range being more contracted, and less than that at the Institution by a difference of $0^{\circ}.6$ in 1867, and of $1^{\circ}.5$ in 1868.

Winds.—The direction of the wind, as indicated by the vane on the tower of the Abbey Church, has been noted down regularly, at the same time as the other observations in the Institution Gardens, during the decade of years to which all the observations relate. But a single daily entry of this kind affords a very imperfect idea of the relative frequency of the different winds, or of the duration of any particular wind, several changes of direction occurring occasionally during the day; whilst it gives us no information respecting the force of the wind, or the amount of its horizontal motion from one period of time to another. These particulars, so important for the full consideration of the laws of weather and climate, can only be obtained by means of an anemometer, which the Institution does not at present possess. I do not therefore attach much value to this column in our meteorological register, though it may be useful and of some interest to put on record such results as it affords.

Distributing then the winds, as entered in the register, under the four heads of N.—E., E.—S., S.—W., and W.—N., the first of these classes embracing the winds from N. and N.E., but not those due E.; the second in like manner E. and S.E., but not those due S.; the third S. and S.W.; the fourth W. and N.W.; it appears that by far the most prevalent winds in Bath are those from the W.—N. quarter, those next in frequency being the

instrument in the garden (of course protected from the direct solar rays), a little way from the house, being at the same time only $69^{\circ}.4$, a difference of more than *five degrees and a half*. On the morning of the 31st, though the previous day had not been so intensely hot as in the former case, the same thermometer at the hall window, at 9 a.m., was 72° , the instrument in the garden being 64° , a difference of *eight degrees*.

S.—W., then the N.—E., and the least frequent those from E.—S. If we take the mean frequency of each class of winds in the several seasons, the result appears as in the following Table :—

	N.—E.	E.—S.	S.—W.	W.—N.
Spring	26.1	17.7	18.4	29.4
Summer	20.2	10.3	22.1	37.5
Autumn	23.0	12.3	22.1	30.5
Winter	17.5	14.6	31.0	24.1

It will be seen that the N. and N.E. winds in Bath, as in most other places in England, attain a maximum in Spring, and are least prevalent in Winter. The S. and S.W., on the contrary, attain a maximum in Winter, and are least prevalent in Spring. This is quite in accordance with the circumstance of the Winter being the wettest season, and the Spring the driest season, in Bath, as before shown, our chief rains coming from the S.W. The W. and N.W. winds are those that mainly characterise the Summer months, while in every season except Winter they predominate over all the others. S.E. winds are chiefly attendant upon weather in a transitional state, and seldom continue long, though more frequent in Spring than at other times of the year.

These results, with regard to the winds in Bath, are not very different from what I obtained in Cambridgeshire, after tabulating them there for nineteen years; and the same order probably prevails over a large part of the southern half of England. Yet, from local conditions of the atmosphere, they may vary in character in different places, and in their effect upon the human frame. Thus the N.E. winds in Bath do not come up to the severity of those winds in the eastern counties, from the circumstance of Bath having a higher mean temperature, with higher

temperatures at night, in the season in which those winds chiefly prevail. Bath is also to a certain extent sheltered from the full force of the easterly winds by the surrounding hills, as has been remarked both by Dr. Granville and Dr. Tunstall in their respective works, to which I would refer those who desire further details on this part of the subject. At the same time, from the great irregularity of the ground, winds except the westerly, when blowing strong, are here and there deflected from their right path, causing eddies and cross-currents in certain parts of the town, which make it difficult to say in some cases from what quarter the wind really blows.

Quality of the Air.—None of the registers last referred to treat of the subject of humidity. Temperature and humidity combined are the points, perhaps, of most consequence to be attended to in the determination of climate. But in a locality like Bath, where the town lies in a hollow, nearly surrounded by hills impeding a free circulation of the air, a third point, I think, ought to be considered, and that is the quality of the air as regards purity. On a former occasion I made some allusion to a depressing effect experienced in the streets of Bath during the summer months by persons not in strong health, which I endeavoured to show was not due exclusively to a high temperature, the fact being that, in the very hot summer of 1868, to which my remarks referred, the maximum heats were not greater in the town than on the hills and some days were even less.*

That the Bath air has this effect upon some constitutions has been noticed by others; and a striking case in point is mentioned by Dr. Granville in his "Spas of England." Quoting from a communication received from an accurate observer who had long resided in Bath, he writes thus:—"Bath air is what is called relaxing. I had a sister who, while she lived in old Bath, was subject to fainting and losing her voice; so that, though an

* See Proceed. of Bath Nat. Hist. Field Club, vol. I., No. 3, p. 56.

excellent singer, she never could sing after a day or two's exertion. She moreover used to lose flesh. The moment she left her abode and went up the hill all these ill effects disappeared, and she got strong again. This was repeated several times so that there was no mistake. At last she found a husband in Wiltshire, on the highlands, and she has continued well ever since."

Cases have occurred to my own knowledge,—some in which the symptoms were not very different from those here described, especially as regards loss of voice—others in which, from languor and relaxation, walking even short distances was painful and fatiguing, when ordinarily long walks could be taken without inconvenience. And these symptoms have been experienced—not in summer only—but occasionally at other times in the year; even in mid-winter, in certain states of weather, the conditions generally being great dampness in the air, with westerly winds, or such winds complicated with north or south, and a low barometer. This shows that a high temperature, though it would, no doubt, aggravate the symptoms, is not the sole cause of them. They seem due rather to an excess of moisture in the air, rendering it less fit for healthy respiration: the action of the heart, in consequence, being weakened, and exertion of any kind more or less laborious. On descending the hill from the Circus towards Queen Square, as also from other points on the higher ground, a steamy cloud may very frequently be seen hanging over the river, and the streets adjacent to it; Beechen Cliff rising directly behind, and, in connection with the other hills, though less close, necessarily obstructing the in-flow of a drier and healthier air from the country beyond the town, to counteract the ill effects of the vitiated stagnant atmosphere within it.

When, however, these symptoms occur in hot summer weather, in the lower parts of the town, there is reason to think that the quality of the air may be further in fault, to a certain extent, from its impurity; such impurity as is known to exist in the close and crowded parts of all towns, the noxious particles in the air

abounding in the summer months, when the decay of animal and vegetable substances goes on most rapidly, and greatly interfering with its salubrity. In the case of Bath, in particular, these noxious particles would not be sufficiently carried off, in consequence of the hills and the confined situation of the town, checking free circulation, as just spoken of. In an Address by Dr. Rumsey, on the subject of Health, to the Social Science Association, in 1868, it was stated, as a demonstrated fact, that—"Town air, even in its best conditions, contains subtle poison, from which the airy upland and the breezy shore are free, and that it also wants some elements of nutrition and purification which the latter supply."

The sources from which these impurities arise are manifold, and may easily be conceived by all who have ever resided in towns, and witnessed the trade operations which are constantly going on in them to meet human requirements in a highly artificial state of society. One of the great purifiers of the air from such contaminating influences is thought to be Ozone, a substance of which we have as yet very insufficient knowledge, and the amount of which, present in the air at any particular time, it seems difficult to determine, from the usual test-papers not being always trustworthy, and the necessary precautions, in order to avoid error from the influence of light and the differences in the force of the wind, not being sufficiently attended to. *

It is, however, generally allowed that ozone is a substance abounding much more in some places than others, especially much more in the country than in towns. There is a good deal said on this subject in an Address delivered before the Royal Society of Edinburgh, on December 22, 1873, by Dr. Andrews, in which he treats of ozone at great length, and from which I beg to quote one or two passages bearing upon the point in question.†

"Ozone," he remarks, "is rarely found in the air of large towns,

* See "Daubeny on Ozone," p. 8, &c.

† See "Nature," vol. ix., p. 347. &c., and especially p. 366.

unless in a suburb when the wind is blowing from the country ; and it is only under the rarest and most exceptional conditions that it is found in the air of the largest and best ventilated apartments. It is, in fact, rapidly destroyed by smoke and other impurities which are present in the air of localities where large bodies of men have fixed their habitation, and I have often observed this destructive action extending to a distance of one or two miles from a manufacturing town, even in fine and bright weather."

On the other hand he says—"Ozone is rarely, if ever, absent in fine weather from the air of the country, and it is more abundant, on the whole, in the air of the mountain than of the plain." He further states that "the permanent absence of ozone from the air of a locality may be regarded as a proof that we are breathing, if I may venture to use the phrase, adulterated air. Its absence from the air of towns, and of large rooms, even in the country, is probably the chief cause of the difference which everyone feels when he breathes the air of a town, or of an apartment however spacious, and afterwards inhales the fresh or ozone-containing air of the open country. It is, indeed, highly probable that many of the most important actions, by which the products of animal and vegetable waste are removed by oxidation from the air, are due to the action of ozone, and could not be effected by ordinary or inactive oxygen."

Have we not in these statements, coming from so high an authority on matters of chemistry, when coupled with what was before said, a plausible explanation of the difference experienced by so many persons in the air of the lower parts of the town of Bath and the air of the hills, as also of the depressing effects of the former upon the system in certain cases?—In hot weather especially everyone must have felt the relief on quitting the streets and getting into the open park, still more on ascending to higher ground when done without the fatigue of walking. I never myself found the effects of such a change so manifest as on one of

those intensely hot days in July, 1868, when in the cool of the evening, after a temperature of near 90° at 3 p.m. with a bright cloudless sky, a drive was taken in an open fly from Darlington Place, up Bathwick Hill : every advance we made seemed to bring us into a purer and more invigorating air, till when at the top, with woods on either side, a refreshing odour of a most peculiar character was perceived, no doubt arising from the presence of ozone in large quantity. But the most striking difference was that experienced on our return into the town, after taking the round by Brass-Knocker, and Coombe Down. No sooner had we crossed the Old Bridge, and entered the streets by the river side, than an odour, as opposite to the one on the high lands as can well be imagined, immediately struck the olfactory organs, of which I dare say the inhabitants of those streets were quite unconscious at the time, but which to us from the strong contrast, seemed perfectly offensive. There was no feeling of the air being cooler at the top of the hill, except in the neighbourhood of trees, than it had been in Darlington Place at first starting ; it was a change in the quality of the air itself that was so remarkable.

Further observations on this part of the meteorology of Bath by practical chemists would be of great value. It would be especially desirable to test the quality of the air in different quarters of the town, and at different periods of the year. According to Dr. Andrews there is conflicting evidence as to the particular seasons in which ozone is most abundant in the air. Some observers say that "the amount is greater in winter than in summer, in spring than in autumn ; while according to others, it is greater in spring and summer than in autumn and winter." There seems to be equal uncertainty as to whether it is greater in the day than in the night, or the reverse.

As there is a "season" in Bath, and times of the year when the place is more resorted to than others, by invalids especially, these questions are not without a local interest. It is much to be desired also, in reference to the whole subject of the climate of

Bath, that observations on the temperature, dew-point, rain, &c., should continue to be made in the Institution Gardens as hitherto.

At the end of another ten years there will be occasion to have them again reduced as now, and made available for comparison with the results put together in this paper. And should additional registers be kept in other places in Bath or in the immediate neighbourhood, as it is hoped may be the case—more especially if some open spot on the level of the Royal Crescent, of intermediate elevation between the lower and higher parts of the town, could be obtained for the erection of a meteorological observatory, as suggested in my Address to this Club in 1872,—and the whole together be carefully examined and compared in their several results with what I have attempted to bring out in the present instance, we should then be able to fix with greater precision than can be attained after only a few years' observations, and in one station alone, the true character of the Bath climate, a matter of so much importance to residents as well as visitors, especially to those who resort to it on the score of health. But I can never hope to undertake any further investigation of the subject myself. I leave it to those who come after me.

On certain Isolated Areas of Mountain Limestone at Luckington and Vobster in the County of Somerset. By J. McMURTRIE, F.G.S.

(Read December 9th, 1874.)

In examining geological maps of Somersetshire, most Geologists must have observed three remarkable outliers of Mountain Limestone, which occur at Luckington and Vobster immediately to the north of the Mendip hills. Surrounded as they are for the most part by coal measures and coal shafts instead of lying far beneath them, their abnormal position has long been the subject of curious

speculation, and different authorities have arrived at very opposite conclusions on the subject. At a recent meeting of the Somersetshire Archæological and Natural History Society the question gave rise to much discussion without leading to any very definite result, and it is well deserving of further inquiry. It is hoped the facts brought forward in the present paper, if they do not settle the question, will add to the information already possessed on the subject.

Descriptive Notes.—In order to convey a clear idea of the position of these Limestones and of their relation to the surrounding strata, I have prepared a diagram on a scale of forty inches to the mile, to which I would direct your attention.*

The principal outcrop of Mountain Limestone in the district under consideration occurs in the Mendip hills, which are flanked by it continuously on both sides. The northern slope of those hills between Whatley and Leigh-on-Mendip forms the base of the diagram, and the Limestone is there seen dipping uniformly to the northward at an angle which Mr. Sanders has recorded as 70 degrees, but in places the beds are almost perpendicular.

The lower slope of the Mendips is occupied by the Millstone Grit, which can be traced continuously along the base of the hills as shewn in the diagram, but it is seldom well exposed on the surface and the prevailing inclination is very difficult to ascertain. In some instances it dips northwards conformably with the Limestone, but at other points there are indications of reverse dips, leading to the conclusion that it has been folded over during the elevation of that range.

Proceeding Northwards from this belt of Millstone Grit, we enter the principal basin of the Somersetshire Coal Measures, which are here extensively exposed on the surface, although to the North East they soon pass beneath the secondary rocks. In the very midst of these Coal Measures, and far separated from

* See a reduced copy of this diagram appended to this paper.

VOBSTER

OOLITE

RED
STONE

ONE

the parent rock, of which they form a part, lie the three isolated masses of Limestone which form the subject of the present paper.

The first and smallest of the three, known as the Tor rock, rises abruptly from the edge of the Mells Lake at Lower Vobster, attaining a height of fifty feet, and presenting a striking feature in the charming scenery of Mells Park. In shape it is oval, measuring about 190 yards from north to south, and 130 yards from east to west, its distance from the nearest outcrop of the same strata in the Mendip range being 850 yards. It is closely surrounded by ordinary Coal Measures shales, and the relation between the two is, generally speaking, hidden by the soil. On the south side, that is towards the lake, the bedding of the Limestone can be distinctly seen, the dip being uniformly to the north-west at a high angle. On the opposite side, however, the dip is to the S. West, at an angle of 45 degrees.

The second and by far the most extensive of these outliers occurs at Upper Vobster, 250 yards to the north of the Tor rock, and 1,300 yards from the nearest Limestone in the Mendip range. It is an irregular oblong figure, extending from the Bilboa coal yard westward to near Page house, its extreme length being 1,150 yards, and the average width exposed about 300 yards. It can be well examined in a quarry at the Bilboa cross-roads, but the finest section of it is obtained in a deep cutting on the Newbury mineral railway, which intersects it from East to West, terminating at the Upper Vobster Limekiln. The prevailing line of strike appears to be East and West, but at some points the beds dip North, and at others South; in fact, they dip in all directions and at all angles, presenting every appearance of confusion and disturbance.

Here, as at Tor rock, the exact junction between the Limestone and the surrounding rocks is a little uncertain, but the outline shown on the diagram is approximately correct. On the South and West it is flanked by Coal Measure shales, but its northern margin is hidden by a thin covering of Inferior

Coliite, so that it may be of greater extent than we are at present aware. Its outcrop line on Sanders' map is generally correct, but there are two exceptions to this, which may be noticed in passing. In a field on the north-west side of the Newbury Railway bridge at Bilboa, there are the remains of a small trial shaft, the *débris* from which consist of Coal shales, whereas at the point referred to, and for nearly a hundred yards to the north of it, Mr. Sanders has shewn Mountain Limestone. On the other hand, near Page house, there are indications that the patch may extend farther westward than Mr. Sanders has mapped it. I base this statement on the discovery of a protruding block of Limestone, about 40 yards from the grounds of Page house. I have been unable to trace its connexion with the Upper Vobster area, and there *may* possibly be no connexion; but it has all the appearance of being *in situ*, and if so, it extends the Limestone some 70 yards farther westward than hitherto noted (see dotted lines on diagram), a fact which, as I will presently shew, is of considerable importance.

The third and last of these isolated areas of Limestone occurs at Luckington, about 800 yards to the west of that last described, and about 1,900 yards from the Limestone of the Mendip range. It is less exposed than either of the other areas, but it can be well examined in a quarry by the road-side, and its general outline can be readily traced. Its extreme length is about 450 yards, and it is from 50 to 120 yards in width. The dip is very variable, being south at one point and east in another. With regard to all these Limestones, it may be remarked, that from their general appearance and their comparatively nonfossiliferous character, they probably belong to the upper portion of the Carboniferous Limestone formation. It is impossible to distinguish between specimens obtained from the less disturbed beds in these outliers, and others obtained from the Mendips, at Soho, but in the former there is a greater prevalence of sparry joints: the fissures, produced by disturbance, having probably become filled with that substance.

This is especially the case in the neighbourhood of Bilboa, where partly from its broken up condition, and partly, it may be, from its contact with the Inferior Oolite, the Limestone presents a very peculiar appearance.

After carefully examining all the three patches, I have been unable to discern *in situ* either Millstone Grit, on the one hand, or Mountain Limestone Shales on the other ; but, in a field to the north of Upper Vobster Limekiln, I have found on the surface numerous stray blocks of Millstone Grit, not distinguishable from the same beds in Mells Park ; and it is quite possible, therefore, that there may be portions of the grit *in situ* not far distant.

Historical Notes.—Although seldom treated of at any length, these Limestones have been noticed by geological writers from a very early date. In an able paper, on “the South Western Coal District of England,” contributed to the Geological Society, by Dr. Buckland and the Rev. W. Conybeare, in the year 1824, they were carefully shewn in both plans and sections ; their origin being attributed to upthrow faults. While differing from those writers on this particular point, I cannot pass on without expressing my admiration of the marvellous industry and general accuracy exhibited in the paper referred to ; a paper full of useful information, and which foreshadowed much that has been written on the district since their day.

Probably, next in order, came the Geologists of the Ordnance Survey, who mapped the Luckington and Upper Vobster Patches, but the Tor rock escaped their notice. In their map, and a corresponding section, they appear to have arrived at much the same conclusion as Messrs. Buckland and Conybeare, viz. : that these areas of Limestone have been lifted up through the coal measures by the agency of faults.

About this time Mr. Sanders published his map, in which he added the Tor rock patch to the two previously observed, but he does not appear to have committed himself to any theory on the subject.

The first distinct departure from the fault theory of which I have any knowledge occurs in a paper read before the North of England Institute of Mining Engineers at Birmingham, in 1866, by Mr. G. C. Greenwell, who, during his residence in Somersetshire, contributed a number of valuable papers on the local Coal-field. He then expressed the opinion "that the same "convulsion which threw over the Coal Measures threw masses of "Limestone along with them, and those marked on the geological "map of the Ordnance Survey are not, as there represented, the "result of the faults ingeniously placed there, but masses detached "from the Mendip range of Limestone situated about a mile to "the south." He also said that "men now living have worked "in coal beneath these masses of Mountain Limestone."

In 1866 and 1867 we find the subject dealt with by Mr. Charles Moore. In his paper, "On Abnormal Secondary Deposits," in the latter year he referred incidentally to these Limestones, and discarding the idea of an upheaval he regarded the overthrow theory as an established fact.

In an essay on the Coal-fields of North Somersetshire in 1867, and some published correspondence which followed it, the same view was maintained by Mr. S. W. Brice, who suggested "that "when the Mendip range was considerably higher than it is now, "masses of Limestone might easily have been dislocated from their "parent rock, and have rolled down a species of inclined plane "into the positions they now occupy." The plans by which he sought to establish the point, however, were not sufficiently accurate, and some of his arguments were, in my opinion, open to objection.

Probably the latest writer on the subject has been Mr. Horace B. Woodward, of the Geological Survey, a gentleman to whom we have been indebted within the last few years for many interesting articles on the geology of this district. In a paper published in the "Geological Magazine," for April, 1871, he altogether dissented from the overthrow theory, and maintained that these areas of

Limestone are to be accounted for by a combination of fault and anticlinal which I shall presently describe.

Such then has been the course of scientific opinion on the subject we are considering, and it appears to range itself under three heads.

1st.—The original fault theory of Dr. Buckland.

2nd.—(Although third in order) the combined fault and anticlinal theory of Mr. H. B. Woodward.

3rd.—The overthrow theory maintained by the various writers already referred to.

I.—The Fault Theory.—When this was first suggested the Coal Measures in the vicinity of these isolated Limestone areas had been little explored. Numerous small shafts had been sunk here and there along the edge of the valley, but the Measures had not been developed in any connected or extensive way, and it is difficult to discover from what data the Ordnance geologists mapped with so much apparent precision the faults indicated on their plans and sections. In order to convey a clear idea of their views I have prepared an enlarged copy of those portions of the Ordnance maps which bear upon the question, from which you will observe that the Luckington patch is shown to be completely hemmed in by faults. At each end of that area are indicated north and south faults extending from Cherry Garden to Leigh on Mendip, and there are east and west faults along each side. In the case of the Upper Vobster Limestone also a north and south fault is shown at the western extremity of the patch.*

In the corresponding section the Coal Measures at Vobster are represented to occupy a comparatively shallow undulating basin not exceeding 1,000 feet in depth, and by assuming an upheaval

* The Ordnance maps and sections being easily accessible these illustrations have not been added, and for similar reasons Mr. Woodward's sections (which are afterwards referred to) have been omitted.

of that extent the Geologists of the Ordnance Survey have sought to account for the abnormal position the Limestones now occupy.

Recent explorations, however, have shewn the basin to be of immensely greater depth, and the probability of this theory is greatly lessened when we consider that in order to fault the Limestone up through the Coal Measures at Luckington we must suppose an upthrow, not of 1,000 feet only, but of from 5,000 to 6,000 feet. Even if other proof were wanting the very extent of the upheaval which we are thus called upon to assume would throw some doubts on the correctness of the theory, but if faults of such enormous extent exist they should be easily traceable in the adjacent district, and let us now inquire how far these assumptions are in accordance with ascertained fact.

Since the days of the Geological Survey several important collieries have been established in the district, throwing much additional light on the subject. New shafts have been sunk at Newbury, Mackintosh, Mells and Vobster, the workings of which have been extended in all directions, and through the kindness of Mr. Batey of Newbury and others I have been enabled to lay before you the facts so proved.

In the case of the Luckington area, the workings of the Mackintosh pit have proved beyond doubt that the faults shewn on the western end, the south side and probably also on the north side of the Limestone do not exist. Only one fault has been discovered there and it runs in a north and south direction, crossing the eastern end of the patch as shewn on the plan, but instead of its being an upthrow it has been well ascertained to be a downthrow west of 750 feet, so that far from establishing the upthrow fault theory it proves exactly the reverse.

As to the Upper Vobster area the strata surrounding the Limestone have not been so thoroughly explored. The eastern workings of the Dunny drift vein at Newbury colliery, which were abandoned some years ago, were in rather a faulty state when they stopped just under the patch, but there was no trace of Limestone

and nothing to induce the belief that a fault of such gigantic dimensions existed there. And at the Mells colliery, immediately to the north of the patch, where some evidence of the fault theory might fairly have been expected I have been unable to learn a single fact to establish its accuracy.

The answer to the fault theory therefore is simply this ; the workings of adjacent collieries which partially surround, and in some instances even pass beneath the Limestone areas, have failed to prove the existence of faults to account for the upheaval.

II.—Mr. Woodward's combined Fault and Anticlinal Theory.—Although I have devoted considerable attention to Mr. Woodward's paper, I am afraid I have failed to follow him fully in the section by which he has sought to account for the Limestone areas under consideration. I have prepared an enlarged copy of his section, the chief features of which are a "fan-shaped anticlinal," and a peculiar combination of faults.

Mr. Woodward is of opinion that, "by introducing a fold to the north, and by calling faults to our assistance, the position of these Limestone masses may be satisfactorily accounted for—and without resorting to any form of structure which is not already known in the Mendip area."

My remarks on the previous head have, I trust, answered that part of Mr. Woodward's theory which requires the agency of faults, and as to the anticlinal, I can only say that with an intimate knowledge of the district, I know of no circumstance to bear out the suggestion. On the contrary, the facts proved by workings in the Great course and Firestone veins at Mells colliery, and by the Catch, Bilboa, Newbury, and Mackintosh pits, are directly opposed to such an assumption, and I trust this will be made more apparent in considering

III.—The Overthrow Theory.—Before attempting to explain the method by which in my opinion these isolated areas of Mountain Limestone are to be accounted for, I would first of all lay before

you more minutely than I have yet done the information we possess on the subject, and I hope to satisfy you that however they may have come to occupy their present position they are superficial masses of no great thickness, that they do not extend downwards to connect with the great underlying stratum of Mountain Limestone, and that the Coal Measures have actually been worked beneath them at various points.

To begin with the Luckington patch; some years ago a branch or "gallery" was driven northwards from the Mackintosh pit at a depth of 250 yards from the surface, cutting the Dunny drift vein at a distance of 320 yards from the shaft. The vein rose to the north at an angle of forty-three degrees, and in following it upwards the workings gradually passed beneath the Limestone as shown by cross hatching on the large diagram. In this instance it was clearly proved that an area of coal 150 yards in length and varying from five to thirty yards in width had actually been worked beneath the Limestone. The branch itself has since been continued to the northwards, passing right under the patch from the southern to the northern side, cutting bed after bed of the Coal Measures which although more tender than usual are quite unbroken, and meeting with no Limestone whatever. In all this there has been no trace whatever of an anticlinal, and the only fault of any importance is the one shewn in the diagram.

It may be remarked, that on examining the surface, I find the Limestone at Luckington surrounded by the remains of six small pits, the *débris* consisting of ordinary Coal Measure shales.

Between Luckington and Upper Vobster occur the workings of the Newbury pit, from which, at a depth of 240 yards from the surface, a branch has been driven 500 yards to the northwards, passing considerably beyond the range of the Limestones. If an anticlinal had existed on their northern side, we ought to have had evidence of it here, but there is none whatever.

With regard to the Upper Vobster area, assuming Mr. Sanders' outcrop to be correct, the eastern workings on the Dunny drift

vein, at Newbury, would appear to have passed beneath the Limestone for a distance of 40 yards. If, however, the Limestone extends farther westward, as suggested in an earlier part of this paper, and as shown by dotted lines on the diagram, the Newbury workings may really have been farther under the patch than is generally supposed.

In a garden, behind some cottages at Upper Vobster, marked A on plan, a well was sunk many years ago, by Mr. Richard Edgell, a bailiff at the Vobster Colliery. It began in Mountain Limestone, but at a depth of 22 feet from the surface it passed into Coal Measures, in which it was continued 4 feet, making a total depth of 26 feet. This information I have obtained from Mr. Edgell himself, who is prepared to vouch for its accuracy, and who has also communicated another important fact. At the time the well in question was sunk, the workmen at Upper Vobster quarry having followed the Limestone a little deeper than usual, at a point marked B, passed through it into shale, and it was ascertained, by levelling the ground, that the shale at the bottom of the well A was on a level with the shale met with at the bottom of the quarry.

A little nearer Bilboa, at the point marked C on the diagram, it is said another well was sunk through the Limestone into Coal Measures, but of this I am not in a position to speak with certainty.

In the corner of a field adjoining the coal-yard at Bilboa, on the south of the patch, are the remains of an old shaft, and I have been informed upon reliable authority that its workings passed beneath the Limestone. At a depth of eighty yards from the surface a branch or gallery was driven north more than 100 yards, and the men who worked in this branch are said to have been within hearing of the workmen in the Dunny drift vein at Upper Catch pit situated in the northern side of the patch.

In the case of the Tor rock area also it has been alleged that the workings of adjacent pits have met beneath the Limestone, but after some enquiry I have been unable to satisfy myself of the

accuracy of the statement. There is a well, however, on the summit of the Tor at D which is said to have passed through the Limestone into Coal Measures, and I have no reason to doubt the fact.

Briefly to sum up then, we have in the case of the Tor rock a well which passed through the Limestone; we have at Upper Vobster a quarry, two wells and the workings of two collieries, which, if the evidence is to be believed, have proved the existence of Coal Measures at a limited depth beneath the Limestone; and we have at Luckington the present workings of the Mackintosh pit, which have passed under the Limestone from side to side, proving that the Coal Measures are continuous beneath.

In order to show more clearly the facts ascertained with regard to the latter area, and to explain more intelligibly my views of the whole question, I have prepared a section of strata extending from the Mendips at Downhead across the Luckington patch to Walton Wood, to which I would ask your particular attention.* It shews the Mendips as they *are* with their central mass of Trap and Old Red Sandstone from which the Mountain Limestone dips northward at a high angle, and it attempts to give a rude idea of the Mendips as they *may* have existed before denuding agencies had washed their higher elevations entirely away. I believe Professor Ramsay has, in one of his sections across those hills, shewn the denuded strata as a continuously curved arch, and estimated their thickness at 4,000 feet. But whatever may have happened in other parts of Mendip where lower angles of elevation prevail in the Limestone, we can hardly suppose this to have been the case in the vicinity of Downhead where the beds are dipping at from seventy to eighty degrees. Whether the power exerted proceeded from eruptive Trap acting from beneath, or some contraction of the earth's surface, which has folded and crumpled up the strata, it has impressed itself strongly on my mind that the

* See reduced copy of this section appended.

Mountain Limestone in the centre of the range at Downhead must have been rudely torn asunder, producing a central valley in the manner shewn on the section. The inclination of the denuded portions we can of course only judge by inference, but in my opinion they were probably more nearly perpendicular than those which remain, if indeed they were not slightly folded over, which I think not improbable.

As to the Millstone Grit, I have little doubt that it was partially folded over. We see evidence of this in the undenuded portions, and the fold was probably even more decided in the portion which has been removed.

In the Coal Measures the action appears to have been of two kinds. At the moment of elevation they were probably nearly perpendicular as we now find the Limestone, but subsequently, the Pennant Rock and the New Rock or Sandstone series have been folded completely over, dipping southwards at an angle of from forty-three to forty-five degrees. This can be shewn both on the surface and in the mines and it does not admit of doubt. The Vobster series, however, shows an entirely different effect. The strata consist of very tender shales, and they appear to have acted like a wedge, settling down between the hard Coal Measure sandstones of the New Rock series on the one hand and the still harder Millstone Grit on the other; assisting, it may be, to force over the New Rock group, but crushing themselves to pieces in the process.*

Of the physical disturbances which thus took place, the Luckington and Vobster Limestones are probably the result; and if I have satisfied you that they have not been upheaved from beneath, they *must* in some way have been folded over from that range, although we may not be able to realise how all this has been

* I have little doubt the higher portions of the Millstone Grit and Mountain Limestone rolled over on the Vobster Shales as they thus settled down, but I have not attempted to show it in the section.

brought about. We cannot pretend to trace in detail the process of elevation, folding over, and settling down, which must then have taken place. And we cannot yet explain, where so much has been denuded, why these masses of Limestone remain. But I trust these imperfect suggestions may set other minds to work, and that this paper may be followed by others which may more fully elucidate the difficult physical geology of the Mendip range.

Notes on a Rhaetic and Lower Lias section on the Bath and Evercreech Line, near Chilcompton, by Rev. H. H. WINWOOD, M.A., F.G.S.

(Read December 9th, 1874.)

The members of the Club may remember that during one of our evening meetings last session we walked together in imagination along the new Line of Railway lately opened between Bath and Evercreech.

Starting from the valley through which the Avon flows we passed over the Lower Lias Clays and Limestones; noticed the Mammalian Drift, consisting of gravel principally derived from our adjoining hills; then we came to certain light-blue Clays, these I ventured to think represented the UPPER Lias Clays, of which there are but few exposures in this locality. After passing through the Tunnel under Devonshire Buildings, cut partly through these Clays and partly through the Sands resting on them, we came on the other side to a cutting of very great geological importance, a section of which taken on both sides was given you at the time. After noticing the cutting of Inferior Oolite resting upon the Sands behind Mr. Moger's house, remarkable for the disturbance of the beds which are much dislocated and dip rapidly towards the valley, we entered the Tunnel cut out of these same Midford Sands.

Emerging to day-light on the other side, we will pass over

some interesting sections of Inferior Oolite resting on light-blue Upper Lias Clays, and a highly fossiliferous exposure of Marlstone and Lower Lias, leaving their description for some future occasion, and glancing at the Conglomerate cutting at Chilcompton halt before the remarkable section about to be described. Immediately to the left of a stone bridge which carries the road called Broadway Lane from Radstock to Old Down, and opposite a house recently burnt down, called Lynch House, is a cutting about forty feet in depth through beds of a most varied colour. Though the attention of the members was first called to this pretty section by Mr. Mc Murtrie during one of the autumn excursions in 1873, the weather was so wet at the time that a cursory glance only could be given. The section, however, appeared to me of sufficient importance to be photographed; this was shortly afterwards done, and the result is before you this evening. It required, however, several subsequent visits to clearly define the proper sequence of the beds, owing to the disturbance which had taken place since they were originally deposited.

You will observe that these beds are not in their original *i.e.* horizontal position, but have been squeezed up into the form of an inverted cone, and constitute what is called a synclinal fold. To account for this we must call in the aid of faults and a considerable amount of lateral pressure. You will see on one side of the section (No. 13) a shoulder of Conglomerate appearing; on the other side, to the east of the bridge, the same formation occurs. Now this palæozoic water beach is a much older formation than the beds which rest against it. So that in the first place one of those minor faults which abound in this our coal-field must have occurred dropping those upper beds down and sinking them below their proper horizon; then a subsequent squeeze between the two older and more solid formations in either side caused them to be broken up and dislocated in the way seen. Whatever may have been the case with similar beds in other places it is evident that these were not deposited in a trough form.

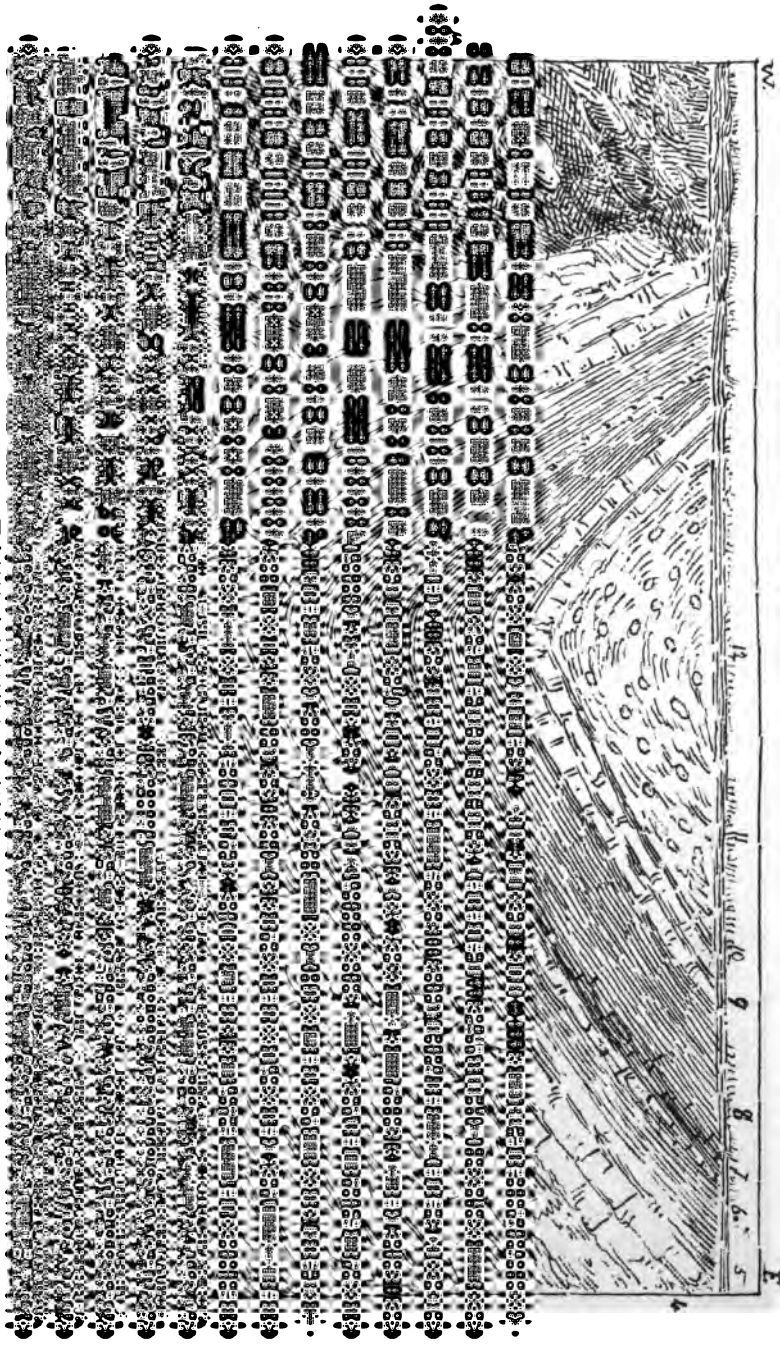
At first sight the colour of the beds (No. 4) was rather misleading, for previous to a more minute examination with the hammer they seemed to be the "Sun bed" of William Smith, and all those below them to be the rubbly beds of the white Lias; but the first blow with the hammer disclosed the absence of the peculiar conchoidal fracture characteristic of that bed and the fact that the light colour was only superficial. Having at last found the true position of this top bed of the white Lias (so persistent in our district) somewhat lower down in the section, the proper sequence of the beds was at once clear. We have here then another example of the "passage beds" between the Trias and the Lias, of which the following is a description.

The cutting runs nearly east and west; at the base close to the rails at the east corner was a patch of light-blue Clay of the Rhætic formation; succeeding to this came a series of broken-up beds of rubbly white Lias (No. 1) capped by two more solid but also fractured beds of white Lias—"Sun bed"—(No. 2). The usual arenaceous band which appears so constantly in all these sections resting on the top bed of the white Lias, and indicating a change in the conditions of the previous deposit, was traced in a slight sandy clay parting. Upon this rested a series of brown broken-up beds of Lower Lias (No. 3), with the two before-mentioned beds which had a creamy-coloured exterior (No. 4). These were succeeded by yellow and blue Clays (Nos. 5 and 6); bands of Rock, parted by a brown sand (Nos. 7, 8, 9); Clay, and Nodular Rock (10 and 11) to the surface debris, containing Belemnites and a small Lima. The bed (numbered 11) was remarkable for the rolled Phosphatic Pebbles which it contained. Fossils were by no means common, but sufficient were found to indicate the general horizons of the various beds.

Lynch House Section.

A Patch of Blue Rhætic Clays at base, succeeded by

	Ft.	In.
1. Rubbly white argillaceous beds, white Lias	... 13	0



17.

17.

17.

17.

17.

17.

					Ft.	In.
2. "Sunbed"	$\left\{ \begin{array}{l} a. 1 \quad 1 \\ b. 0 \quad 11 \end{array} \right\}$	...	...	...	2	0
Slight Arenaceous parting.						
3. Broken-up beds of Lower Lias, brown on exterior	...	...	...	...	15	10
4. Two beds of hard rock, with <i>Myacites</i> , <i>Terebratula</i> , <i>Ostrea</i> and <i>Belemnites</i> — crystalline at base, gritty on top with rolled phosphatic nodules and quartz pebbles	$\left\{ \begin{array}{l} a. 1 \quad 3 \\ b. 1 \quad 4 \end{array} \right\}$	...	...	...	2	7
5. Yellow clay	...	...	...	...	1	3
6. Blue clay	...	...	...	...	2	3
7. Two bands of rock with clay parting	...	...	...	...	1	6
8. Brown iron sand	...	...	...	...	1	2
9. Rock	...	...	...	...	0	10
10. Arenaceous clay	...	...	...	...	0	6
11. Gritty rock with rolled phosphatic nodules	...	...	...	...	0	10
12. Debris, with <i>Belemnites acutus</i> , <i>Lima</i> and <i>Terebratula</i> <i>Walcotti</i>	...	...	...	...	3	8

These necessarily dry details need, perhaps, some apology. It is given generally to but few members of a mixed Field Club to feel the same intense interest in the Rocks forming the hills and valleys over which they walk, as their brothers of the hammer do. But each intelligent mind has its own peculiar hobby. One delights in hunting up the dusty records of the past for the scattered scraps of information they contain of places and persons; another rejoices in the addition of some new plant to his herbarium, a new shell to his collection, a rare form of fungus to his list; another likes to recall to his imagination the peoples who have left their trace behind in chambered tumuli, Roman villa, or fretted roof and decorated pier; some such pursuit adds a zest to daily life. As one then of those who take an interest in the mighty forces, the long-continued but gentle influences, which have formed the rocks and sculptured the physical features of hill and dale around us, I unhesitatingly assert that the pursuit of geology will yield unbounded gratification to every one who

tries to unravel its secrets; and that as a science it stands second to none in the healthy recreation it affords to both body and mind, giving strength to the one, and elevating thoughts to the other.

Further remarks on the Bath Fungi. By C. E. BROOME, MA., F.L.S.

(*Read March 17th, 1875.*)

In continuing my notices of the Fungi of the neighbourhood of Bath, I shall adhere to the arrangement which Mr. Berkeley has adopted in his "Outlines of British Fungology," with this difference, that his 11th Order, Nidulariacei, having been already treated of in connection with his 9th Order, Trichogastres, as a more natural arrangement, I shall pass on to his 3rd Family, Coniomycetes, which commences with his 12th Order,

SPHÆRONEMEI.

The Family Coniomycetes derives its name from the Greek words konis dust, and muke a Fungus. The important character consists in the multitude of the spores which are produced in great abundance on the tips or lateral branches of a comparatively scanty Mycelium, from the threads of which the spores are easily detached when ripe, and thus form little dusty heaps or, in some cases, cirri, on the exterior of the substance on which the plant grows. In some of the members of this group of Fungi the spores are produced within little closed conceptacles called perithecia, which are either seated externally on the surface or buried more or less deeply in the substance on which they grow. In this case, the spores are either ejected through a minute pore on the summit, or dispersed on the irregular breaking up of the perithecia. Other Genera of the group possess no true perithecium of their own, but their spores are produced within a false conceptacle formed from

the bark or tissues of the plant on which they grow; in other cases the spores are produced without any covering whatever. I have before remarked that Fungi have been up to a late period divided into two grand sets, according to the way in which their fruit is produced, either naked on the tips of threads or within little sacs called asci. The group I am now treating of comes under the first set, whose spores are on the tips of threads called basidia; but Fries long ago remarked that many errors in systematic arrangement arose from attending too much to microscopical characters and not sufficiently to those of structure and development. Affinity, he says, is to be considered first, then character. Thus he considers that certain species bearing naked spores cannot be separated from others whose fruit is contained in asci, merely on that account without regard to their similarity in point of growth and structure; and he adds, in corroboration of his views, that it is impossible to separate species closely related by morphology and history, when he finds that, in certain cases, the spores have become naked from absorption or disappearance of the asci, in which at one or other period of their growth they were enclosed. For instance, speaking of *Chætomium*, a pretty little Fungus common on damp paper, he says, if it be examined when moist the asci will not be seen, but that they are evident enough when the plant is dry, and even now, with our improved microscopes, if we examine this plant when quite mature, or rather gone by, we shall find that the asci have been absorbed, and we should be disposed to place it among the naked-spored group, *Coniomycetes*, unless, guided by its morphology and affinity, we should perceive its true relationship, and place it amongst the *Ascomycetes*, which is its true position. Fries includes in his family, *Pyrenomycetes*, such Fungi as produce their fruit, whether naked or in asci, within proper closed conceptacles or perithecia, where we see that he pays little attention to the character of what is called endosporous or exosporous fruit-formation. Typically, says Fries, the *Pyrenomycetes*

must be regarded as ascigerous, but the asci are frequently absent or changed into naked spores. Thus, he considers *Sphoeria acuta* with naked spores, as a degenerate state of *Sphoeria rostellata* with ascigerous fruit. Guided, therefore, by a keen eye for affinity, he does not allow endosporous or exosporous fruit to form a character of generic value, scarcely, indeed, of specific importance. And in such Genera as *Diplodia*, *Hendersonia*, &c., he regards the fruit not as true spores, naked fruit, but rather as asci containing the fruit, inasmuch as the spores are attached to the perithecium by little stalks or basidia, as is the case with asci; while in truly endosporous species the fruit is produced free within the asci, by what is called differentiation of their contents. Tulasne has taken a somewhat different view of matters. He remarks that Fungi, like higher plants, are propagated by various methods, and he has shown that many of those cases which Fries regards as degenerate or abnormal fruit are, in reality, distinct means provided by nature for the continuation of the species; thus, as in the Tiger-lily, the plant can be reproduced by seed or by buds, formed in the axils of the leaves, so in the plants I am now considering, some of the species can be propagated by naked spores arising from the early condition of the threads, or mycelium, conidia; or, secondly, by more highly organized spores, which he calls stylospores produced on little stalks, naked; or, thirdly, by fruit produced in asci, sporidia, and he considers that all these forms of fruit frequently belong to a single species. This theory, if shown to be true in a few instances, will probably hold good in all, and eventually lead to the dismissal of a vast horde of so-called Genera and species from their position as such, and to their incorporation with other forms. But a great deal of patient research and investigation, and many favouring circumstances are necessary before all the described species can find their proper resting-place and be included in one system. Perhaps it may be of interest to mention a few cases tending in this direction which have occurred in our own district.

One of the most conspicuous is that of *Sphæria Epochnii* *B and Br.* The conidiiferous state of this species has long been known as *Epochnium Fungorum* *Fr.* It grows upon decaying *Thelephoræ*, forming black patches, composed of a mass of threads, the tips of which produce abundance of conidia. This occurred in profusion at Warleigh Manor some years ago, and, on close inspection, there appeared to be perithecia in a young state occupying the centre of the patches. These were watched, and, after two or three months, the perithecia were found to contain ascigerous fruit, which was not very unlike the conidia. Here was strong confirmation of Tulasnes theory. *Sphæria innumera* *B and Br.* is another instance which occurred first in our neighbourhood. Tulasne has named it *Chaetosphæria*, from the curious fructiferous hairs which accompany it bearing the conidia, and of which he has given beautiful figures in his *Carpologia*. I must refer to his book (Vol. II.) for various instances illustrative of the subject. In the more highly developed species of the *Coniomycetes*, we meet with perithecia, closely resembling those of *Sphæria*; but, as we descend in the scale, we find the perithecia becoming less and less perfect, sometimes flat and membranaceous, then dimidiate (*Pilidium*); in *Vermicularia* it is mouthless and bristly, in *Septoria* more or less incorporated with the matrix, in *Discella* it appears to be composed of the bark of the wood on which it grows. Descending further, we have the order *Melanconieï*, without any perithecium, where the spores are produced beneath the bark of trees and exude in dark masses. *Gloeosporium* consists of a mass of hyaline spores formed beneath the cuticle of leaves and oozing out in tendrils. Still lower in the Family, we find in *Torulacei* no semblance of any perithecium, but the spores are produced on the outside of rotting wood, herbaceous stems, or leaves. All the above Genera are more interesting from their connection with other ascigerous forms than from their own peculiar structure. *Neottiospora caricum* *Desm* and its probable relations to *Volutella melaloma* *B and Br.* is an exception. *Dinemasporium graminis*,

with its ciliated spores, *Septonema princeps* *B and Br.*, considered, probably with justice, by Tulasne, as a stylosporous state of *Massaria eburnea* *Tul*; the Genus *Pestalozzia* of De Notaris, with ciliated spores, and *Cheirospora* *Fr.*, having spores connected in bundles, seated on the tips of hyaline threads, and immersed in gelatine, the connection of which with any ascigerous species has never yet been traced out; or, amongst the *Torulacei*, the Genera *Bactridium*, *Helicosporium*, *Sporoschisma*, *Dictyosporium*, and the very rare *Tetraploa* on grass stems, *Bloxamia*, whose true position in the series is doubtful, all present us with points of interest not general among the *Coniomycetes*. We come next to the Order *Puccinieï*, the species of which are produced on living plants, and constitute some of the greatest scourges of the human race, and whose history, as worked out by Tulasne and De Bary* and other writers, is of the highest interest. Many of the plants of this Order are very widely spread, as, for instance, *Puccinea graminis* *P.* Corn-mildew, which is only too common in our cornfields, extends south to New Zealand. *Trichobasis linearis* *Lév*, another pest to agriculture, is considered by Tulasne to be merely an early condition of the last; it is commonly known as Rust, but in some cases there are two distinct forms of fruit included in the spots of mildew. *Tilletia caries* *Tul*, known as Bunt, occupies, with its foetid spores, the whole interior of grains of wheat, and, if it were not checked by steeping the seed-corn before it is sown, would spread to such an extent as to render the whole crop unfit for food; fortunately, a solution of corro-

* De Bary endeavours to prove by experiment that the *Uredo*-spores and *Teleuto*-spores (*Puccinia*) of *Puccinia graminis* are developed on *graminis* only, but that the germinative threads which arise from the sporidia contained in the *Teleutospores* that have survived the winter, will only vegetate on the leaves of the berberry, and that they produce there *Æcidium berberidis*. He considers that the *Æcidium* is a mere transitional form of *Puccinea graminis*. The *Æcidium* spores sown on leaves of grasses germinated and produced plants of the *Uredo*.—A. S. N. V. V. 262.

sive sublimate, used as a steep for the seed, destroys the vitality of the pest. The Bunt is, nevertheless, very interesting to the microscopist, the spores are large and beautifully reticulated, and the way in which they give origin to secondary, and even to tertiary forms of fruit, as delineated by Tulasne, possesses so much interest, as to make them well worth the trouble of raising. We have about 17 Genera of the Puccinieae distinguished by the number of cells in their spores, and by their mode of attachment to the mycelium. In *Aegma*, the spores are many-celled and somewhat moniliform or necklace-like, and seem to form a state of transition to *Torula*. In *Puccinia* the spores are two-celled and seated on long footstalks ; while in *Podisoma*, a fungus infesting juniper, the spores, very similar to those of *Puccinia*, are agglutinated together by gelatine, and spread out above into a club-shaped mass. Several Genera of this Order with unicellular spores are regarded by Tulasne as mere states or conditions of various species of *Puccinia*. Unger regarded them as merely diseased cells of the plants on which they occur, and not autonomous plants ; but this notion seems very improbable when we consider the complicated fruit of certain species. In *Coleosporium* there are two forms of fruit, one separating at the joints and the other persistent. So, in *Melampsora* there are two forms, one globose, the other forming a dense mass of wedge-shaped bodies. In *Cystopus*, we find a receptacle of branched threads occupying the intercellular passages of leaves, which give origin to necklace-shaped rows of conidia produced beneath the cuticle ; these at length burst out and escape, and are dispersed to germinate anew and produce fresh plants. I must not pass over, without allusion, the account of the reproduction of *Cystopus*, given by De Bary, as it possesses great interest. He says, "If the Conidia are placed on a slip of glass in a drop of water, the following changes occur :— A projection is soon formed at one point of the conidia ; the granular contents are then gradually separated into five or more distinct masses, each containing a zoospore ; these are shortly after

expelled through the swelling above-mentioned, which has become pierced by a small passage, and soon swim off by the aid of ciliæ; they then fix themselves upon one of the stomata of the leaf into which they project a thread or tube, and so produce a mycelium in the intercellular passages similar to that from which they originated. Besides these conidia, De Bary found large spherical bodies with a thick membranous coat produced upon the threads of the mycelium within the leaf, whose presence was indicated by a red or orange colour visible on the surface; these were the result of a process of fertilization similar to that of certain Algae, as *Saprolegnia*, and in *Peronospora* among Fungi. Pringsheim named them gonospheres; De Bary calls them oospores, after fertilization. The oospore retains its form for some months, and is at length set free by the decomposition of the surrounding tissues. The endospore (or body contained within the oospore) then bursts forth and is found to be full of zoospores similar to those produced from each of the conidia. De Bary considered that each oospore contains one hundred or more of these zoospores. They germinate, like the other zoospores, upon the stomata. It was observed that the threads penetrated the leaves only at a stomate, and also that the threads soon ceased to grow unless they fell on a cotyledonal stomate; on the stomata of true leaves they emitted threads, but these threads soon ceased to grow. I must now pass on to other Genera. *Ustilago* consists of unicellular spores produced on delicate threads; it occupies sometimes the fruit of *Carices* and other plants, and even the anthers of some, as *Silene dioica*. Miss Becker observed that in this case it produced a change of sex in the plant by a process of repression or degradation, converting the male flowers into female, or rendering the plants hermaphrodite.

The 16th Order, *Æcidacei* is characterized by a cellular peridium. The Mycelium traverses the tissue of living plants which are terminated by single, or concatenate, spores. These

spores produce in germination a second order of spores, and these again, sometimes, a third. It is probable that where the spores are not concatenate new spores are formed at the tips of the old sporophores as fast as the ripe spores drop off, and that thus the dusty mass of spores arises which a single plant often produces. Besides this form of fruit, many species possess closed conceptacles producing minute spores of a totally different character to the former. Tulasne has named these Pycnidia; they may be readily found on the leaves of the garden Anemone, which are infested by *Æcidium quadrifidum*, and they generally occur on the opposite side of the leaf to that infested by the cups of the *Æcidium*. In *Röestelia* the peridium is elongate, and the spores are dispersed on the bursting, or laceration, of the peridia. All the species constitute pretty objects for the microscope; they are popularly called cluster-cups.

Linneæus remarks (*De Usu Musc.*, 1766, c. II. xx.) that "When we contemplate the wonders of nature we cannot but be roused to an acknowledgement of the great goodness of the Deity who has presented to our eyes, even in the most minute matters, such numerous proofs of wisdom that any one who is desirous of acquiring knowledge has materials before him sufficient for the study of a whole life, and even then he can scarcely attain to a superficial acquaintance with His works." The instances of *Cystopus*, as its history has been explored by De Bary, and *Tilletia* by Tulasne, as well as the amount of investigation exhibited by both in tracing the connection of the various Fungi of different Orders, hitherto so considered, demonstrate fully the truth of Linneæus's remark, and offer to anyone wanting amusement or occupation, a rich field for study attainable in a very limited space. And the beautiful illustrations of the Messrs. Tulasne show what room there is for the display of artistic drawing in delineating the microscopic beauties of the structure of the lowest class of vegetables.

FAMILY III. CONIOMYCETES.*

Spores, either solitary or concatenate, produced on the tips of generally short threads, which are either naked or contained in a perithecium, rarely compacted into a gelatinous mass.

ORDER 12. SPHERONEMEI.†

Perithecium more or less distinct.

GENUS 97. CONIOTHYRIUM *Corda*.‡

Perithecium membranaceous, bursting irregularly or transversely. Spores simple, at length free.

- 1.—*Coniothyrium glomeratum Corda*. *Corda Icones Fasc 4*, figure 108.

GENUS 98. LEPTOSTROMA. *Fr.*§

Perithecium membranaceous, flat, breaking off at the base. Spores simple, minute.

- 1.—*Leptostroma caricinum Fr.* Spye Park, Wilts., on carices.
- 2.—*Leptostroma filicinum Fr.* Sow. t 394, figure 10. Near Chippenham.
- 3.—*Leptostroma spirææ Fr.* St. Catherine's, on *spiræa ulmaria*.

GENUS 99. PHOMA. *Fr.*||

Perithecium punctiform or subglobose, often spurious, or incorporated with the matrix, discharging the minute, simple spores by a small orifice at the apex. Spores mostly hyaline.

- 1.—*Phoma nothum B and Br.* On plane, Batheaston, A. N. H., No. 395.
- 2.—*Phoma radula B and Br.* On plane, Batheaston, A. N. H., No. 396.

* Coniomyces, from the Greek konis dust and muke a fungus.

† Sphæronemei, from sphæronema the typical genus.

‡ Coniothyrium, from konis dust and thura a door.

§ Leptostroma, from leptos thin and stroma a bed.

|| Phoma, from phos a pustule.

- 3.—*Phoma eriophorum* *B and Br.* On rotten Spanish chestnuts, Bath, A. N. H., No. 812.
- 4.—*Phoma sticticum* *B and Br.* On box., Spye Park, A. N. H., No. 400.
- 5.—*Phoma sambucina* *Desm.* On elder, Spye Park.

Only five species of this Genus are yet recorded for our district ; no doubt many more exist here, but they are difficult to identify.

GENUS 100. *LEPTOTHYRIUM.* *Kze.**

Perithecium flat, irregular, at length breaking off at the base. Spores cylindrical, oblong, or irregular.

- 1.—*Leptothyrium juglandis* *Lib.* On walnut leaves, Bathford.
- 2.—*Leptothyrium fragariæ* *Lib.* On leaves of strawberries, Batheaston.

L. ribis has not occurred.

GENUS 101. *ACTINOTHYRIUM.*† *Kze.*

Perithecia orbicular, radiato-fibrous. Spores fusiform, slender,

- 1.—*Actinothyrium graminis* *Kze.* On dead grasses, near Chippenham. Grev. t 218.

The only species.

GENUS 102. *CRYPTOSPORIUM.* *Kze.‡*

Perithecium always covered by the cuticle, carnosomembraneous, at length pierced. Spores fusiform, simple.

- 1.—*Cryptosporium caricis* *Cda.* Spye Park, on sedges. Corda in Sturm III. II. t 50.
- 2.—*Cryptosporium neesii* *Cda.* Spye Park, on dead twigs of birch.

The only British species.

* *Leptothyrium*, from leptos thin and thura a door.

† *Actinothyrium*, from actin a ray and thura a door.

‡ *Cryptosporium*, from cryptos concealed and sporos seed.

GENUS 103. SPHÆRONEMA. *Tode**

Perithecia free, opaque or hyaline. Spores minute, at length oozing out by the ostiolum and forming a globule.

- 1.—*Sphæronema epileucum* *B. and Br.* MSS. Perithecia cream-colored, conical, tomentose, springing from a white mycelium, crowded together. Spores innate, uniseptate, 0.0006 to 0.0007 inch long. Seated on the outside of dead leaves of *carex paniculata*, Spye Park, March, 1863.

No others out of four British have occurred.

GENUS 104. APOSPHÆRIA. *B.†*

Perithecia at length free, distinct from the matrix, furnished with a papillœform ostiolum. Spores minute.

- 1.—*Aposphæria acuta* *B.* on dead nettles. Common. Grev. t 239, f. 1.
- 2.—*Aposphæria complanata* *B.* On dead herbaceous stems. Tode f. 88.

The only British species.

GENUS 105. SPHÆROPSIS. *Lév.‡*

Perithecia distinct, carbonaceous. Spores various, simple escaping by a perforation at the apex.

- 1.—*Sphæropsis candollei* *B and Br.* On dead box leaves. Batheaston, *Currey* Lin. Trans. XXII. 283, t 49, f. 186.
- 2.—*Sphæropsis parca* *B and Br.* On dead leaves of *abies excelsa*. Spye Park, A. N. H., No. 420.‡
- 3.—*Sphæropsis strobil* *B and Br.* O dead leaves of *pinus strobus*. Spye Park, A. N. H. No. 421.
- 4.—*Sphæropsis geniculata* *B and Br.* With the last, A. N. H., No. 421.‡
- 5.—*Sphæropsis epitricha* *B and Br.* On *equisetum palustre*. Spye Park, A. N., No. 422.

* *Sphæronema*, from *sphaira* a sphere and *naima* gelatine.

† *Aposphæria*, from *apo* from (receding from) and *sphæria*.

‡ *Sphæropsis*, from *sphaira* and *ops* an aspect.

6.—*Sphæropsis mutica* *B and Br.* On elder. Spy Park, A. N. H., No. 422.

7.—*Sphæropsis menispora* *B and Br.* On typha. Spy Park, A. N. H., No. 425.

Seven out of fifteen British have been found in our district, others are no doubt common.

GENUS 106. DOTHIORA. *Fr.†*

Nucleus slowly developed, gelatinoso-grumous, black, immersed in an erumpent stroma, subcarbonaceous externally, fleshy within, always mouthless. Spores pedicellate, obovate, simple.

Two British species, neither found in our district.

GENUS 107. CLINTERIUM. *Fr.‡*

Perithecium erumpent, free, carbonaceous, bursting by fissures at the apex. Spores simple.

Neither of two British species are met with here.

GENUS 108. ACROSPERMUM. *Tode.§*

Perithecia cylindrical, free. Spores long, asciform, flexuous, erect.

1.—*AcrospERMUM compressum* *Tode.* Grev. t 182. On nettle stems, Batheaston.

2.—*AcrospERMUM graminum* *Lib.* On dead grasses, Batheaston. There are only two British species.

GENUS 109. DIPLODIA. *Fr.||*

Perithecia distinct, carbonaceous. Uniseptate, escaping by a perforation at the apex.

1.—*Diplodia vulgaris* *Lév.* On dead wood. Common.

2.—*Diplodia paupercula* *B and Br.* On Plane Batheaston, A. N. H., No. 406.

† *Dothiora*, from *dothien* a tumour.

‡ *Clinterium*, from *clinter* a couch.

§ *AcrospERMUM*, from *acros* the top and *sperma* a seed.

|| *Diplodia*, *diploos* double.

- 3.—*Diplodia tecta* *B and Br.* On laurel leaves, Batheaston, A. N. H., No. 411.
- 4.—*Diplodia consors* *B and Br.* A. N. H., No. 412. With the last.
- 5.—*Diplodia perpusilla* *Desm.* On grass, Batheaston.

We claim four only out of fourteen British species.

GENUS 110. HENDERSONIA. *B.**

Perithecia distinct. Spores two to multiseptate, escaping by a terminal pore.

- 1.—*Hendersonia arcus* *B and Br.* On twigs of box, Batheaston, A. N. H., No. 413.
- 2.—*Hendersonia mutabilis* *B and Br.* On twigs of plane Batheaston, A. N. H., No. 414.
- 3.—*Hendersonia polycystis* *B and Br.* On dead birch, Spy Park, A. N. H., No. 415.
- 4.—*Hendersonia stephensii* *B and Br.* On dead stems of pteris, aquilina, Bristol, A. N. H., No. 502.

In this Genus we lay claim to four out of eight British species.

GENUS 111. DARLUCA. *Cast.†*

Perithecia delicate. Spores containing a row of sporidiola, oozing out and forming a tendril

- 1.—*Darluca filum* *Cast.* On Uredines, Batheaston. Desmaziere, Ann. Sci. Nat., 1849, XI., 345 (*Hendersonia*).
- 2.—*Darluca Typhoidearum* *B and Br.*, A. N. H., No. 417.
- 3.—*Darluca macropus* *B and Br.*, A. N. H., No. 416.

Three out of four British species.

GENUS 112. VERMICULARIA. *Tode.‡*

Perithecium thin, mouthless, generally bristly. Spores vermiculate.

* *Hendersonia*, after a botanist—Mr. Henderson.

† *Darluca*, named in honour of M- Michel Darluc.

‡ *Vermicularia*, from *vermis* a worm, on account of the worm-like spores

- 1.—*Vermicularia trichella* *Grev.* t 345. On dead ivy leaves, common.
- 2.—*Vermicularia dematium* *Fr.* On dead herbaceous stems, Batheaston.
- 3.—*Vermicularia atramentaria* *B and Br.* On dead potato stems, Batheaston. Three out of four British species.

GENUS 113. *DISCOSIA.* *Lib.**

Perithecium flat, opening at the base. Spores septate, obliquely aristate at either end.

- 1.—*Discosia alnea* *Lib.* On dead leaves, Batheaston. *Sphæria artocreas* *Tode* II., fig. 72. The only British species.

GENUS 114. *PILIDIUM.*† *Kze.*

Perithecium scutelliform, smooth, shining, opening irregularly. Spores curved, without appendages.

- Pilidium carbonaceum* *Lib.* On willow twigs, St. Catherine's. (*Cenangium fuliginosum*) *Fr.* One out of two British species.

GENUS 115. *MELASMIA.* *Lév.‡*

Perithecium membranaceous, dehiscent above, swollen, at length depressed and rugose, growing in a thin, spotlike, effused receptacle. Spores minute.

- Melasmia acerina* *Lév.* On leaves common. Tulasne considers this plant to be the *Spermogonia* of *Rhytisma acerinum*. *Lév.* Ann. Sci. Nat., 1846, p. 276. Tul. Carp. III. p. 117. t XV., fig. 12. There are two British species.

GENUS 116. *PIGGOTTIA.* *B and Br.§*

Perithesia irregular, very thin, obsolete below, forming by confluence a wrinkled mass, bursting by a lacerated fissure. Spores rather large, obovate, at length tomiparous.

* *Discosia*, from *discus*, a disk or quoit, from the form of the perithecia.

† *Pilidium*, from *pilidion*, a small hat.

‡ *Melasmia*, from *melasma*, a black spot.

§ *Piggottia*, named after Mr. Piggott, an English botanist.

- 1.—*Piggottia astroidea* *B and Br.* A. N. H., No. 503. On living elm leaves. Common. The only species.

GENUS 117. SEPTORIA. *Fr.**

- 1.—*Septoria Ulmi*, *Kze.* Grev t 112 on living elm leaves. Bath-easton.
- 2.—*Septoria avellanæ* *B and Br* MSS. On dying hazel leaves. It grows in rings forming at first dark green, and afterwards brown spots on the leaves. Perithecia conical, minute, pierced by a circular pore at the apex, whence the spores exude and form little cirri. Spores lunate, curved, about 0.0004 inch long. There are more than 20 British species recorded, but they have not been examined yet in this locality, they are doubtless numerous.

GENUS 118. ASCOCHYTA. *Lib.†*

Perithecia distinct, delicate. Spores oozing out, uniseptate or simple. Neither of the four British species have yet occurred here.

GENUS 119. CYSTOTRICHIA. *B and Br.‡*

Perithecia bursting longitudinally. Sporophores branched, articulated, beset here and there with oblong, uniseptate spores.

- 1.—*Cystotricha striola* *B and Br.* A. N. H., No. 448 with a fig, on naked wood, Batheaston. This is doubtless the spermo-goniferous state of some ascigerous fungus.

GENUS 120. NEOTTIOSPORA. *Desm.§*

Perithecia concealed, with a central perforation. Spores hyaline, crested.

- 1.—*Neottiospora caricum* *Desm.* exsicc. No. 717, *Annals. Scien. Nat.*, 1843, xix., p. 346. *B and Br.*, A. N. H., No. 435. The only species. On *carex pendula*, Rudlow, Batheaston, &c.

* *Septoria*, from septum a division, from the septate spores.

† *Ascochyta*—perhaps from ascos and chutos—fluid.

‡ *Cystotricha*, from kustis, a bladder, and thrix a hair.

§ *Neottiospora*, from neottion, a young bird.

GENUS 121. EXCIPULA. *Fr.**

Perithecia delicate, hispid, open above. Spores hyaline, attenuated, not appendiculate.

- 1.—Excipula, strigosa *Fr.*, on carex. Spyre Park, and on dead grasses. Rudlow, &c. Corda Icones iii., figure 78.
- 2.—Excipula chætostroma *B and Br.* A. N. H., No. 445, with a figure. On old ash keys, Bristol.
- 3.—Excipula fusispora *B and Br.* A. N. H., No. 814, with a figure. On Clematis, Vitalba, Batheaston. Three out of four British.

GENUS 122. DINEMASPORIUM. *Lév.†*

Perithecia open above, delicate, hispid. Spores hyaline, aristate at either end.

- 1.—Dinemasporium graminum *Lév.* on dead grasses, Batheaston. *Lév.*, Ana. Scien. Nat., 1846, p. 274. Corda Icones iii., figure 79; the only species.

GENUS 123. MYXORMIA. *B and Br.‡*

Perithecium composed of flocci, with free apices, open above. Spores concatenate, involved in gelatine.

- 1.—Myxormia atro-viridis *B and Br.*, on dead grass (aira cœspitosa), Batheaston. A. N. H., No. 447, with a figure. The only species.

GENUS 124. PROSTHEMIUM. *Kze.§*

Perithecia carbonaceous. Spores fasciculate, fusiform, septate, attached to articulated threads.

* Excipula, from excipulus, a vessel.

† Dinemasporium, from dis twice, and nema a thread.

‡ Myxormia, from myxa, slime and orme a tendency.

§ Prosthemiium, from prosthema, the spores being, as it were, applied to the threads.

- 1.—*Prosthemium betulinum* *Kze*, on dead birch twigs, Spye Park. Probably a stylosporous form of *Massaria siparia* *B and Br*.
- 2.—*Prosthemium stellare* *Riess*, on alder twigs, Spye Park. *Riess* in *Bot. Zeitung*, 1853, p. 130, t 3, figures 28—31. *B and Br.*, A. N. H., No. 939. The only two species.

GENUS 125. *ASTEROMA*. *Dc.**

Perithecia flat, with no determinate orifice, attached to creeping, branched threads. Spores simple or uniseptate.

- 1.—*Asteroma rosæ* *Dc.*, on living rose leaves; very common. *B.*, A. N. H., No. 202, t 11, figure 5. The only species observed here out of 6 British.

GENUS 126. *RABENHORSTIA*. *Fr.†*

Conceptacle thin, subcarbonaceous, cup-shaped, dimidiate, above covered by the adnate cuticle, celluloso—lacunose within. Ostiolum simple, nucleus gelatinous.

Neither of two British species have yet occurred in our district.

GENUS 127. *CYTISPORA*. *Fr.‡*

Perithecia irregular, or compound and radiating. Spores minute, mostly curved, oozing out from a common apex in the form of globules or tendrils.

Cytispora rubescens *Fr.*, on twigs of roses, Batheaston.

Other forms occur, but they have not been named as from their connection with sphaeriæ, probably none are autonomous. Tulasne considers this in part a spermatiferous state of *Valsa leucostoma*, *carpologia*, p. 185.

* *Asteroma*, from aster, a star.

† *Rabenhorstia*, named in honour of Dr. L. Rabenhorst, the eminent cryptogamic botanist of Dresden.

‡ *Cytispora*, from kutos, a sinuous cavity, and sporos a seed.

GENUS 128. MICROPERA. *Lér.**

Perithecia innate, membranaceous, gaping above, without any common ostiolum. Spores simple, linear.

The only British species has not occurred here. *Lér.*, *Anna. Scien. Nat.*, 1846, p. 283.

GENUS 129. DISCELLA. *B and Br.†*

Perithecium spurious, nearly simple, sometimes obsolete above or entirely wanting, and hence excipuliform. Spores elongated, simple or uniseptate.

- 1.—*Discella desmazieri*, *B and Br.*, on lime twigs, near Chippenham. *A. N. H.*, No. 427, t 12, fig. 8 a.
- 2.—*Discella platyspora* *B and Br.*, on plane twigs, Batheaston. *A. N. H.*, No. 428.

We have two out of five British species.

GENUS 130. PHLYCTÆNA. *Desm.‡*

Perithecium spurious, simple, never deficient above. Spores elongated.

We possess neither of two British species.

GENUS 131. CEUTHOSPORA. *Fr.§*

Perithecium spurious, innate, stromatiform, multicellular. Spores ejected from one or more orifices.

- 1.—*Ceuthospora phacidioides*. *Grev.* t 253, on holly leaves, Batheaston.
 - 2.—*Ceuthospora lauri*. *Grev.* t 254. on laurel leaves, Batheaston.
- The only species.

* *Micropera*, from mikros, small and peiro, to pierce.

† *Discella*, diminutive of discus, a disk.

‡ *Phlyctæna*, from phlyctæna (Greek), a blister.

§ *Ceuthospora*, from keutho, to conceal, and sporos a seed.

GENUS 132. ERIOSPORA. *B & Br.* *

Stroma multicellular. Spores ejected by a common orifice, quaternate, filiform, seated on short sporophores.

- 1.—*Eriospora leucostoma*, *B & Br.* A. N. H., No. 438, with a figure, on dead leaves of juncus. The only species.

ORDER 13. MELANCONIEL. *Lk.* †

Perithecium obsolete, or quite wanting.

GENUS 133. MELANCONIUM. *Lk.*

Spores, simple, oozing out in a dark mass.

- 1.—*Melanconium*, bicolor. *Nees* t 2, figure 27, on birch. Spye Park.
 - 2.—*Melanconium magnum*. *Grev* t 349, Keynsham, on Walnut.
- We possess two out of three British species.

GENUS 134. STEGONOSPORIUM. *Cda.* ‡

Spores unilocular, the endochrome transversely septate, or cellulose, oozing out in a black mass.

- 1.—*Stegonosporium cellulosum* *Cda.*, on dead branches of sycamore, Batheaston. The only British species.

GENUS 135. STILBOSPORA. *P.* §

Spores, septate, oozing out in a black mass.

- 1.—*Stilbospora ovata* *P.*, on beech, Batheaston. *Grev.* t 212, figure 2.
 - 2.—*Stilbospora macrosperma* *P.* Corda, in Sturm, t 21, on oak, Batheaston. The stylosporous form of *Massaria inquinans*.
- Two species out of three British.

GENUS 136. ASTEROSPORIUM. *Kze.* ||

Spores stellate, oozing out in a black mass.

* *Eriospora*, from erion, wool and sporos, a seed.

† *Melanconium*, from melas, black and konis dust.

‡ *Stegonosporium*, from stego, to cover, and sporos, a seed.

§ *Stilbospora*, from stilbo, to shine, and sporos-seed.

|| *Asterosporium*, from aster, a star and sporos-seed.

- 1.—*Asterosporium hoffmanni*, *M. and N.* Currey in *Microscopical Journal*, iv. t 11, figure 1—9. The only species—common on beech twigs.

GENUS 137. CORYNEUM. *Kze.* *

Spores septate, seated on a cushion-like stroma.

- 1.—*Coryneum disciforme*, *Kze.*—on birch, Spy Park. Kunze *M. H. I.*, p. 76, figure 18.
- 2.—*Coryneum compactum*, *B and Br.* *A. N. H.*, No. 449—on dead elm twigs, near Bristol.
- 3.—*Coryneum kunzei*, *Corda.* *Icones* iv., figure 131—on oak Rudlow.
- 4.—*Coryneum microstictum*, *B and Br.* *A. N. H.*, No. 451—on dead twigs of roses, Batheaston.
- 5.—*Coryneum macrospermum*, *B and Br.* *A. N. H.*, No. 941, t 15, figure 12—on beech, Batheaston, also on elm poles. Probably stylospore of *Melogramma oligosporum*. Five out of eight British.

GENUS 138. PESTALOZZIA. *De Not.* †

Spores seated on a long peduncle, crested above. This Genus has not occurred in our district.

GENUS 139. CHEIROSPORA. *Fr.* ‡

Spores collected in bundles, at the tip of hyaline, filiform, sporophores, forming moniliform threads.

- 1.—*Cheirospora botryospora*, *Fr.*—on beech twigs, Batheaston. *B and Br.*, *A. N. H.*, No. 441. The only species:

GENUS 140. NEMASPORA. *P.* §

Spores colored, oozing out in long tendrils. Spores of two kinds, some minute, others filiform, with a strong curvature. Neither of two British species has been found in this district.

* *Coryneum*, from *korune*, a club.

† *Pestalozzia*, named after an Italian botanist.

‡ *Cheirospora*, from *cheir* the hand, and *spora* a seed.

§ *Nemaspora*, from *nema*, a thread and *spora*.

GENUS 141. MYXOSPORIUM. *De Not's.* *

Spores coloured, minute, of one kind, forming tendrils. No species has occurred in this district.

GENUS 142. GLÆOSPORIUM. *Mont.* †

Spores hyaline, simple, of one kind, oozing out in tendrils.

- 1.—Glæosporium umbrinellum, *B and Br.*, A. N. H., No. 1144, t 3, figure 5.
- 2.—Glæosporium ficariæ, *B*, A. N. H., No. 135—on *Ranunculus ficaria*. Common.

ORDER 14. TORULACEI ‡

Perithecium altogether wanting. Fructifying surface naked. Spores compound, or arising from repeated division, very rarely reduced to a single cell.

GENUS 143. TORULA. *P.*

Spores tomiparous, simple.

- 1.—Torula ovalispora, *B*. Common on stumps, *Conoplea cinerea* *P*.
- 2.—Torula abbreviata *Cda*. *Pinus sylvestris*, &c., Langridge.
- 3.—Torula hysterioides *Cda*. On poles, &c., Batheaston. *Cda*. Fasc. I., fig. 139.
- 4.—Torula herbarum *Lk*. On dead herbaceous stems, very common.
- 5.—Torula Stilbospora *Cda*. On willow, Batheaston. *Cda*. Icones V., fig. 13.
- 6.—Torula graminis. *Desm*. On dead grasses common. *Desm*. Ann. Sci. Nat., 1834, II. t 2., fig. 6. We have 6 out of 13 British.

GENUS 144. BACTRIDIUM. *Kze.* §

Spores radiating, coloured or hyaline, oblong, multiseptate.

* Myxosporium, from mûxa, gluten and sporos.

† Glæosporium, from gloios, viscous and sporos.

‡ Torulacei, from Torula, the typical genus from toros, a twisted cord.

§ Bactridium, from bactron, a staff, and eides a resemblance.

- 1.—*Bactridium flavum* *Kze.* On elm stumps, Batheaston. *Kze.*
M.H. I. t I., fig. 2.
- 2.—*Bactridium Helvellæ* *B and Br.* A.N.H., No. 816, with a fig :
on *Peziza testacea*, Bathford. Two out of three British
species pertain to this district.

GENUS 145. *HELICOSPORIUM* *Nees.**

Parasitical. Spores filiform, articulated, spirally involute.

Helicosporium vegetum *Nees* near Bristol, on sticks. *Nees.*
Syst. d. Pilze fig. 66.

We possess one out of two British species.

GENUS 146. *BISPORA.* *Cda.†*

Flocci tomiparous, moniliform, composed of didymous spores.

- 1.—*Bispora monilioides* *Cda.* On stumps, Batheaston. *Cda.*
Icones I., fig. 143.

GENUS 147. *SEPTONEMA* *Cda.‡*

Flocci tomiparous, moniliform, composed of multiseptate spores.

1. *Septonema elongatispora* *Preuss* in Sturm's Deutschlands
Flora III. VI., 72 t 36. On nettle stems, Batheaston.
 - 2.—*Septonema concentricum* *B. and Br.* MSS. Rabenhorst Fun :
Europæ. exsicci : No. 777. On larch chips, &c., Batheaston.
- Septonema septatum* *Bon.* Two out of four species described
as British by Mr. Cooke.

GENUS 148. *SPOROSCHISMA* *B. and Br.§*

Flocci erect, simple. Outer membrane tough, inarticulate.
Endochrome at length emergent, breaking up into quadrisepate.
spores.

- 1.—*Sporoschisma mirabile* *B and Br.* A.N.H., No. 467. On
decaying wood Batheaston.

* *Helicosporium*, from helix a spire and sporos.

† *Bispora*, from bis double and sporos.

‡ *Septonema*, from septum a partition and nema a thread.

§ *Sporoschisma*, from sporos, and schizo, to split.

This species is always accompanied by *Helminthosporium bacilliforme* *Mont.* The only species.

GENUS 149. *SPORIDESMIUM* *Lk.**

Flocci mostly irregular, pluricellular, springing immediately from the obscure mycelium, rarely borne upon a distinct peduncle, more rarely uniseptate.

- 1.—*Sporidesmium polymorphum* *Cda.* Icones I., 119. On dead stems of wild mignonette, Bathford.
- 2.—*Sporidesmium lobatum* *B and Br.* A.N.H., No. 1146. On rotting wood, Batheaston.
- 3.—*Sporidesmium abruptum* *B and Br.* On rotting wood, Batheaston.
- 4.—*Sporidesmium fasciculare* *Cda.*, Batheaston. *Cda.* Icones I. t II., fig. 114.
- 5.—*Sporidesmium uniseptatum* *B and Br.* A.N.H., No. 815 t 9, fig. 2, Batheaston. On clematis vitalba.
- 6.—*Sporidesmium paradoxum* *Cda.* Icones II. t VIII., fig. 28. p. 6. On willow leaves near Bristol.

GENUS 150. *CONIOTHECIUM* *Cda.†*

At length naked. Spores multicellular, irregular, conglutinate. There are two species, but probably they are both mere states of sphaeriæ.

- 1.—*Coniothecium amentacearum* *Cda.* On willows, St. Catherine's *Cda.* Icones I. t I., fig. 26.

Coniothecium betulinum *Cda.* On birch twigs, Spy Park. *Cda.* Icones I. t I., fig. 25.

GENUS 151. *DICTYOSPORIUM* *Cda.‡*

Spores linguæform, erect, plane, cellular. Cells subconcentric.

- 1.—*Dictyosporium elegans* *Cda.* On decaying oak, *Cda.* Icones II., fig. 29.

The only species.

* *Sporidesmium*, from *sporos*, and *desmos* a bond.

† *Coniothecium*, from *konis* dust, and *theka* a receptacle.

‡ *Dictyosporium*, from *dictyon*, a net and *sporos*.

GENUS 152. TETRAPLOA *B and Br.**

Spores mostly quadriarticulate, growing together in fours and each crowned with a jointed bristle.

- 1.—*Tetraploa aristata B and Br.* A.N.H., No. 457, with a figure on grass, Batheaston. The only species.

GENUS 153. ECHINOBOTRYUM *Cda.†*

Parasitical. Spores unicellular, stellato-fasciculate, ovato-acuminate, rough.

- 1.—*Echinobotryum atrum Cda.* Icones III., fig. 6. On moulds Batheaston. The only species.

GENUS 154. GYMNOSPORIUM *Cda.‡* Icones II., fig. I.

Mycelium very obscure. Spores unicellular, arising apparently from the matrix. The only British species *G. arundinis Cda.* has not been met with here.

ORDER 15. PUCCINIEI. *P.*

Parasitic on living plants. Peridium none. Spores. Producing on germination secondary spores.

GENUS 155. XENODOCHUS. SCHLECHT.§

Spores multiseptate, moniliform, breaking up into many distinct articulations.

Xenodochus carbonarius Schlecht the only species, has not occurred in the district, it is parasitic on *Uredo miniata* or a condition of it.

GENUS 156. TRIPHAGMIUM. *Lk.||*

Spores trilocular ; septa mostly vertical and horizontal.

- 1.—*Triphragmium ulmariae Lk.* On *Spiraea ulmaria*, near Bristol. The only British species.

† *Tetraploa*, from *tettara*, four, and *ploion* a ship or boat.

‡ *Echinobotryum*, from *echinus*, a hedgehog, and *botrys*, a cluster of grapes.

§ *Gymnosporium*, from *gymnos* naked, and *sporos*.

§ *Xenodochus*, from *xenodokeia*, the reception of strangers.

|| *Triphragmium*, from *tris*, thrice, and *phragma*, a wall or division.

GENUS 157. AREGMA *Fr.**

Spores cylindrical, multiseptate, scarcely moniliform, borne on a long peduncle.

- 1.—*Aregma bulbosum* *Fr.* common on leaves of blackberry, Cooke, M.F. t 3, fig. 40.
- 2.—*Aregma gracile* *B.* On raspberry leaves, Batheaston, Cooke, M.F. t 8, fig. 162—164.
- 3.—*Aregma obtusatum* *Fr. Grev.* t 57. On potentilla fragariastrum, common. Three out of five British.

GENUS 158. PUCCINIA† *P.*

Spores uniseptate, supported on a distinct peduncle.

- 1.—*Puccinia graminis* *P.* On wheat and grasses only too common—Corn mildew.
- 2.—*Puccinia striola* *Lk.* On carices.
- 3.—*Puccinia veronicarum* *Dc.* Batheaston, on veronicas.
- 4.—*Puccinia glechomatis* *Dc.* On ground ivy, Bathampton, &c.
- 5.—*Puccinia betonicæ* *Lk.* On betony common.
6. *Puccinia anemones* *P.* On various anemones common.
7. *Puccinia umbelliferarum* *Dc.* Common on umbelliferous plants *Grev.* t 42.
- 8.—*Puccinia circææ* *P.* On enchanter's nightshade, Batheaston.
9. *Puccinia prunorum* *Lk.* On plum leaves common.
- 10.—*Puccinia umbilici* *Guep.* On Cotyledon umbilicus, Batheaston.
- 11.—*Puccinia fabæ* *Lk.* On bean leaves common.
- 12.—*Puccinia vincæ* *Cast.* On Periwinkle, Batheaston.

Numerous others might be recorded in our district if attention were paid to them—at present only twelve are in my herbarium as denizens of the district out of more than 40 British

* *Aregma*, from *a*, not, and *regma*, an opening; the spores coming off entire.

† *Puccinia*, from *Puccini*, an Italian professor.

GENUS 159. GYMNOSPORANGIUM *Dc.**

Peduncles extremely long, agglutinated by gelatine into a tremelloid, expanded mass. Spores uniseptate.

Gymnosporangium juniperi Lk. On juniper. It has not occurred in this district. The only British species.

GENUS 160. PODISOMA *Lk.†*

Peduncles extremely long, agglutinated by gelatine into a common stem, spreading out above into a clavariæform mass. Spores uniseptate.

- 1.—*Podisoma juniperi communis Fr.* On stems of juniper, Bath-easton. *Bull* t 427 fig. 1. We have one species only out of three British.

GENUS 161. UREDO *Lev.‡*

Stroma composed of little irregular cells, forming a lentiform disc, whose surface is covered with many layers of cells, each of which encloses a spore. Spores simple, always without any appendage.

- 1.—*Uredo Lini Dc.* On *Linum catharticum* common.
§ *Lecythea Lini Lé v.* Cooke. M.F. t 8 fig. 165-167.
- 2.—*Uredo confluens P.* On *Mercurialis perennis* common.
- 3.—*Uredo symphyti Dc.* On comfrey common.

The above three species are those hitherto collected in this district, many others doubtless occur. There are thirteen named in Berkeley's Outlines.

GENUS 162. TRICHOBASIS *Lév.||*

Spores free, attached at first to a short peduncle, caducous.

- 1.—*Trichobasis rubigo-vera Lé v.* On corn and grasses common.

* *Gymnosporangium*, from *gymnos*, naked, and *sporos*.

† *Podisoma*, from *pous*, a foot and *soma*, a body.

‡ *Uredo*, from *uro*, to burn

§ *Lecythea*, from *lecythos*, the yolk of an egg.

|| *Trichobasis*, from *thrix*, a hair, and *basis*, a foundation.

- 2.—*Trichobasis linearis* Lév. On grasses common.
- 3.—*Trichobasis flosculorum* var *Taraxici*. Batheaston.
- 4.—*Trichobasis fabæ* Lév. Common.
- 5.—*Trichobasis suaveolens* Lév. On thistles, Rudlow.
- 6.—*Trichobasis vincæ* B. On Periwinkle, Rudlow.

Six species out of twenty-five in the Outlines are all recorded here.

GENUS 163. *UROMYCES* Lév. *

Spores unilocular, attached permanently to a decided peduncle of greater or less length.

- 1.—*Uromyces Alliorum* Dc. On *Gagea lutea* near St. Catherine's. *Sow.* t 411.
- 2.—*Uromyces limonii* Lév. Clevedon, on *Statice limonium*.
- 3.—*Uromyces ficariæ* Lév. On *Ranunculus ficaria*, Batheaston. Cooke M.F. t 7, fig. 156, 157.
- 4.—*Uromyces trifolii* Lév. Bathford. Nine species are quoted in the "Outlines" but there is considerable confusion in the genera. We only claim five at present.

GENUS 164. *COLEOSPORIUM* Lév.†

Spores cylindrical septate, some separating at the joints, some of a different nature, persistent.

- 1.—*Coleosporium tussilaginis* Lév. On coltsfoot common. Cooke M.F., t 8, fig. 180, 181.
- 2.—*Coleosporium pingue* Lév. On roses common.
- 3.—*Coleosporium rhinanthacearum* Lév. On *Rhinanthus*, Hanham.
- 4.—*Coleosporium sonchi-arvensis*, Lév. On sow thistle common. Cooke M.F., t 8, fig 178, 179. Four from nine species in the "Outlines."

GENUS 165. *MELAMPSORA* Cast.‡

Spores of two orders, crowded into a dense, compact mass, with or without a covering, wedge-shaped.

* *Uromyces*, from uro, to burn, and muke.

† *Coleosporium*, from koleos, a sheath, and sporos a seed.

‡ *Melampsora*, from melas, black, and psora, a roughness.

- 1.—*Melampsora euphorbiæ* *Cast.* On spurge. Cooke M.F., pl. ix, fig. 193, 194. Common.
- 2.—*Melampsora salicina* *Lév.* On sallow, Batheaston. Two out of five in the "Outlines."

GENUS 166. *LECYTHEA* *Lév.*

Stroma surrounded or sprinkled with elongated, abortive spores. Spores free, invested with their mother-cell, or concatenate.

- 1.—*Lecythea baryi*. A.N.H. No. 755. On grass.
- 2.—*Lecythea euphorbiæ* *Lév.* On spurge, Batheaston.
- 3.—*Lecythea saliceti* *Lév.* On willows. Three out of twelve common British species.

GENUS 167. *CYSTOPUS* *Lév.**

Receptacle consisting of thick, branched threads. Spores concatenate, at length separating.

- 1.—*Cystopus candidus* *Lév. Grev.* t 251. Cooke M.F. pl. x., fig. 198-200 and 205-207. On cabbages and various cruciferæ common. The only species in the "Outlines." Mr. Cooke has four.

GENUS 168. *POLYCYSTIS* *Lév.†*

Spores irregular, consisting of several cells.

- 1.—*Polycystis colchici* *Tul.* Ann. Sci. Nat. VII., p. 117, 1847. On leaves of autumnal crocus. Rudlow, Se. Catherines.
- 2.—*Polycystis violæ* *B and Br.* A. N. H. 487. Batheaston. On leaves of *Viola odorata*.
- 3.—*Polycystis pompholygodes* *Lév?* On *Helleborus viridis*, near St. Catherine's, Batheaston. Three out of four British species.

GENUS 169. *TILLETIA*. *Tul.‡*

Spores spherical, springing from delicate branched threads. Epispore reticulated.

* *Cystopus*, from *kustos*, a bladder, and *pous*, a foot.

† *Polycystis*, from *polus*, many, and *kustos*.

‡ *Tilletia* from Tillet, a French agriculturist.

- 1.—*Tilletia caries* *Tul.* Bunt. On grains of wheat, &c. *Tul.* Anu. Scien. Nat., 1847, VII., t 5, fig. 1—16. The only species.

GENUS 170. *Ustilago* *Lk.**

Plant deeply seated. Spores simple, springing from delicate threads, or produced in the form of closely-packed cells, which ultimately break up into a powdery mass.

- 1.—*Ustilago segetum* *Ditton.* Very common on seeds of corn and grasses. *Tul.* Ann. Scien. Nat., 1847, t 3, fig. 1—12.
- 2.—*Ustilago urceolorum.* *Tul.* On seeds of Carices, near Bristol. *Tul.* Ann. Scien. Nat., 1847, VII., t 4, fig. 7—10.
- 3.—*Ustilago longissima* *Tul.* On leaves of *Poa aquatica*, Bath-easton. *Tul.* l. c. Cooke M. F. t 5, fig. 105—107.
- 4.—*Ustilago receptaculorum* *Fr.* On receptacles of *Tragopogon*, Bathampton. *Tul.* l. c. t 4, fig. 1. Four species out of fifteen in the "Outlines."

GENUS 117. *TUBURCINIA.* *Fr. †*

Plant deeply seated. Spores multicellular, subglobose or conchiform. Cooke M. F, t 3, fig. 54. Neither of two British species have occurred here.

ORDER 16. *ÆCIDIACEI. ‡*

Peridium distinctly cellular.

GENUS 172. *RÆSTELIA.* *Reb.§*

Peridium elongated, the component cells at length separating or lacerated.

- 1.—*Ræstelia lacerata* *Tul Grov* t 209. On leaves of hawthorn, Batheaston. The only species out of three British.

* *Ustilago*, from *ustulo* to scorch.

† *Tubercinia*, from *tubercinor* to devour.

‡ *Æcidiacei* from *Æcidium*, the typical Genus.

§ *Ræstelia* from *raister*, a destroyer.

GENUS 173. PERIDERMIIUM. *Chev.**

Peridium elongated, at length ruptured irregularly. Neither of two British species have been found in our district.

GENUS 174. ÆCIDIUM. *P.†*

Peridium rarely elongated, opening by radiating, reflected teeth or very short, and bursting irregularly. Spores concatenate.

- 1.—*Æcidium Allii* *Grev.* On *Allium ursinum*, Rudlow.
- 2.—*Æcidium Ari. B.* On *Arum maculatum*, Rudlow.
- 3.—*Æcidium rubellum* *P.* On docks, Rudlow. *Sow.* t 405.
- 4.—*Æcidium primulæ* *Dc.*, near Bristol.
- 5.—*Æcidium ranunculacearum* *Dc.* On buttercups, Rudlow.
- 6.—*Æcidium quadrifidum* *Dc.* On garden anemones, Batheaston, &c.
- 7.—*Æcidium berberidis* *P.* On barberry, Batheaston. *Grev.* t 97.
- 8.—*Æcidium albescens* *Grev.* On *Adoxa moschatellina*, Batheaston.
- 9.—*Æcidium crassum* *P.* On Buckthorn, near Chippenham. *P.* *Icones et Des.* 10., fig. 1—2.
- 10.—*Æcidium euphorbiæ* *P.* On spurge, Batheaston.
- 11.—*Æcidium urticæ* *Dc.* On nettles common.
- 12.—*Æcidium thesii* *Desm.* On *Thesium linophyllum*, Castle Coombe, Cooke, *M.F. t B.*, fig. 50. 51. Twelve species out of 30 in the “outlines.”

GENUS 175. ENDOPHYLLUM. *Lev.‡*

Peridium enclosed in the leaf, bursting irregularly. The only British species *E. sempervivi* has not occurred in our district.

GENUS 176. SYNCHYTRIUM. *De. By.§*

Cellular bodies without any mycelium, seated beneath the

* Peridermium, from peri, around, and derma, a skin.

† Æcidium, from aikion a wheel.

‡ Endophyllum from endos within, and phyllon a leaf.

§ Synchytrium from syn, together and chytris a vessel.

cuticle of living leaves, each cell at length giving origin to a zoosporangium from which numerous zoospores eventually proceed and pierce the cuticle of fresh leaves and there reproduce zoosporangia. Zoosporangia set free by the decomposition of the tissues of the leaf.

Synchytrium taraxici De. By. On dandelion, Batheaston. Bot. Zeit., 1868, p. 81, &c., with figures. *Synchytrium mercurialis* Fekl. On *Mercurialis perennis*, Batheaston.

GENUS 177. *PROTOMYCES* Unger. *

Protomyces Unger. *Physnerma gibbosum* Wallr.

Plant immersed in the tissues of living plants. Spores spherical, unicellular, opaque in the mass, forming there swollen masses. Wallr.

* *Protomyces* from *protos* first, and make a fungus.

Further gleanings in the Mendip and its Valleys. By Rev. Preb. SCARTH, M.A.

(Read 13th January, 1876.)

Last season I brought before the Club some particulars relating to this interesting district. The subject was not quite exhausted, though the leading features and much of the history were touched, some further discoveries have been made, and increased attention given to the remains that are still in process of discovery in the mining district.

The Club has also visited the mining district in one of its excursions, seen the Roman remains collected at the smelting mill at Charter-house, and also examined the process of washing the lead, or rather the ancient slimes, which have been left by the Roman workers, who seem to have possessed themselves of all the ore near the surface, but have left not only in their smelting, but also in their washing, enough to render the re-smelting and re-washing remunerative.

The district was also visited on the occasion of the British Association holding their Meeting at Bristol in the autumn of last year. (September, 1875.) A large party at the end of the Meeting were invited by the High Sheriff, Mr. Hill, who owns a property on Mendip, to visit the district, and having taken Stanton Drew on the way, were received at Hazel Manor, and then visited the Roman remains at Charterhouse, and the Amphitheatre, proceeding from thence to the Cheddar Cliffs. A paper also on the primitive population of the Mendip hills was read in the Anthropological Section of the British Association, By Mr. Phené, in which it was sought to establish from the peculiar position of the Barrows and other remains, that a similar race had once possessed this region, to that which had produced the mounds figures and barrows of the Mississippi valley, and traces of which race are said to have been found in Scotland. I am not going at present to discuss this somewhat doubtful theory, or to give the reins to imagination, but simply to record what may be useful for the Club to know, and what may conduce to the building up of sound and reliable history.

In my former paper I had to observe that only remnants of Inscriptions on stone have been found at Charterhouse on Mendip, in addition to the stamped pigs and "Lamina" of Roman lead found there. I have now to record that on the occasion of the visit of the British Association, a copy of an inscription was brought to me, which was said to be Roman, but which I could not at the time decypher. Being in some doubt as to its authenticity, I asked that the stone itself might be produced, and in a few days was gratified by having it brought to my house by the finder Mr. Panes, and Mr. Somers of Blagdon, to whom I am much indebted for calling my attention to coins and other Roman relics discovered at Charterhouse. The stone is still in my keeping, and I have taken many squeezes and sent them to various learned men skilled in Roman Epigraphy, as Professor Hübner of Berlin, Dr. McCaul, the President of University

College, Toronto, Mr. Roach Smith and others; but the stone having been cut in half, and used for building purposes, the interpretation remains doubtful, until the other portion can be discovered. I read it as follows, but I have also the pleasure of laying before the Members of this Club a squeeze, which they may examine and interpret for themselves.

M ·

A V G

V O R E S

R O R F E C T

I V C E N I ·

I O N R · M A

O R M I P S

I C O R (?)

Line 1.—The letter M is clearly marked on the first line, after which comes a leaf stop.

Line 2.—In the second line the three letters A V G are very plain.

Line 3.—In the third line we have V O, and after the O the letters R E S very distinct.

Line 4.—Latter portion of an R followed by OR, the O and R being enucleated, or cut as one letter. Then comes the word F E C T, a small I being placed within the circle of the C.

Line 5.—We have IV very clear, then C or C E not quite so distinct, with the letter E in the circle of the C or G, which is followed by the letters N and the down stroke of a T, but the upper stroke is not clear, so it may be the letter I, and this is followed by a leaf stop.

Line 6.—Begins with a straight stroke (but the stone is broken away,) then the letter O and an N in the circle of the O followed by the letter R, then a leaf stop, indistinct, and the letters M A.

Line 7.—OR enucleated, or placed very near together, then an M and what appears to be an I or E, with P S following.

Line 8.—The eighth line is much weathered, but I C is plain, then a small o and what seems to be a D or R, the rest is quite indistinct.

The inscription, therefore, consists of eight lines, with the first half of the stone wanting. Any interpretation must therefore be uncertain until the remaining portion, if still existing, can be found.

The length or height is $1\frac{1}{2}$ feet. The width, in the direction of the lines of lettering, only $9\frac{1}{2}$ inches. It was found by Mr. B. Panes of Blagdon, in the course of pulling down the ruins of an old house situated north of the Town-field, where so many remains have been discovered in carting away the old scoria for the purpose of being re-smelted.

The form of the letters is rude, and they are ill cut, and the use of the leaf stops would probably fix the date towards the time of the Antonines, which is also the date of some of the leaden Lamina. Professor Hübner regards it as *funereal*, and restores it conjecturally, but with the greatest reserve, not feeling certain of some of the letters.

M ·
AVG
VO RES
ROR FECIT
IVCENT
OMOROMA
ORMIPS
IC'OP

d M
c. cornelio AVG
to fratri sVO RES
tituta soROR FECIT.
miles coh. IV. Cent
flavi dOMOROMA

Which may be read thus conjecturally

[Dis] Manibus
[C. Cornelio] Auc, (or Aug.)
[to fratri s] uo Res
[tituta so] ror fecit
[Militi cohortis] IV. Cen [turia]
[Flavi d] om Roma

It would therefore be a tribute of regard from a sister to her brother, a soldier of the 4th Cohort and of the century of Flavius, and this is all that can be made out as yet.

Mr. Roach Smith, however would read it as a Votive Tablet.

[I O] M. Iovi Optimo Maximo
[ET NVMINA] AVG. Et Numina Augusti
[TEMPLVM [or ARAM] VO[TO] REST [ITVIT]

I am not satisfied with either of these renderings, tho' Professor Hübner's appears most probable. The second line however has the word AVG not AVC, which therefore cannot be AVCTVS, and Aug. is the abbreviation of an imperial title, not the name of a man. The G is plain on the stone.

But in Mr. Smith's rendering the VO has no TO following, tho' there is space for the letters, but there evidently have not been any, and therefore we are again at fault.

The finding of this lettered memorial, however, encourages the hope that more may eventually be forthcoming, and other inscriptions of a less mutilated character reward the interest which is now begun to be felt in the recovery of Roman remains. The noble collection of Roman Inscriptions found in Britain, which has just issued from the Academy of Berlin, and which forms the 7th volume of the "Corpus Inscriptionum Latinarum," must greatly aid scholars in this branch of research, and will enable them to form an idea how *much* this country has contributed to Roman Epigraphy.

This grand classification of Heathen Inscriptions is to be followed by one of whatever *Christian* remains are still existing in this island, or known to have existed.* Professor Hübner has collected not only whatever inscription has been found upon stone, but also the stamps remaining upon tiles and pottery, amphoræ and patellæ, leaden weights, rings, or oculists stamps. This collection altho' not quite perfect, is a noble effort at

* This is now published by Williams and Norgate, London, and the Title, "Inscriptiones Britanniae Christianae."

classification and arrangement, and we cannot but feel sorry that English scholars and antiquaries should not have been beforehand in this very important national historical labour.

In an article in the Journal of the Archæological Association for June, 1875, I have given a summary of the Roman remains found at Charterhouse up to that time, (see "Notes on the roads, camps, and mining operations of the Romans in the Mendip Hills," p. 141), also a list of the coins which had come under my notice.

Since then other objects have come to light, and a small cabinet of Roman coins found in Mendip, on and around the ancient Roman workings, has been formed by Mr. Hill, lately High Sheriff of Bristol, and his brother Colonel Hill, amongst them is a fine ancient British coin, but no Saxon coins have yet been discovered.

Several small red Cornelian seals with devices on them, have also been found at Charterhouse and along the Mendip Hills. The devices on which are very elegant, of these I have taken impressions; up to the present time seven have come under my notice. Two of these belong to a parishioner, who obtained them from a woman at Rowberrow some years ago. Roman weights made of lead, either cubes, or globular with the ends flattened, and indented with holes to mark the weight, 1. 2. 3. 4. ounces; leaden marbles, like bullets, one of these has a small hole, and is hollow to a certain extent to allow of a thread being inserted, it seems to have been used as a weight; and "glandes" or sling missiles have been found, and preserved at the Charterhouse smelting mill, where the collection is becoming extensive, and was very neatly arranged for exhibition by the agent Mr. Rogers on the visit of the British Association.

Larger leaden weights of various size and form, weighing 1lb. 10oz. 5lbs. 1oz. 26lbs. 12oz., clay or earthen crucibles, of a circular form, 3 inches high by 2 in width, and 2 inches high by 1 in width. Five *Horse shoes* quite perfect, a valuable accession to the small number yet found in this country, of these I have made careful drawings and measurements. The nails remain in two

instances in the groove, and the shoes are smaller, and the iron plates wider than the horse shoes at present in use.

The iron implements are wonderfully perfect, an *iron chain* with hook and apparatus to suspend a kettle of large size, an *iron knife* with blade $10\frac{1}{4}$ inches in length, an *iron chopper*, blade $6\frac{1}{2}$ inches wide, and more than a foot in length. A curious iron implement 16 inches in length, with a flat hexagonal shaped blade, apparently for stirring melted metal. Such implements as these are very rare, because the iron soon oxidizes and the weapon crumbles to powder, but the scoria has preserved these in good condition.

A perfect wooden spade has been preserved, of native oak, the handle and shovel portion being of one piece. For some time I doubted the reality of this "find," it appeared so perfect, but I am informed by the over-looker that it is undoubtedly genuine, and was dug up with the other Roman remains. Hitherto all the mining shovels discovered have been flat blades of wood, sometimes capped with iron at the edge, with a square hole in the blade, to admit the handle, by means of which they were worked horizontally in the mine. This is in the form of a modern spade, without any hole through the handle to grasp by, and the handle is only somewhat thicker than the shaft. The entire length is only 1 foot 9 inches. It was found 5 feet under the ground.

But the most interesting discovery which has been made since the Club visited the workings on the 25th May, 1875, is a cake of pure lead weighing 78lbs. which had been left just in the condition in which it had run out of the ore into the hearth, the under surface is quite flat, the upper surface rounded slightly. It had evidently been run out and then entirely forgotten, and so left until it was found during the late summer.

Some very good specimens of thick sheet glass have been found, one piece having a flange at the side, and another piece is ribbed; all this indicates refinement and art. The indications are small,

but when we consider the lapse of ages and that this district was occupied by a cell of Carthusian monks, who, no doubt, turned to account all the remnants of Roman work which could be made available for practical use, we are rather thankful to find so many indications still preserved. One lettered fragment I must notice, it is a portion of the outer rim of a *mortarium*, or cullander, the inner surface of which is powdered with small fragments of gravel for the purposes of triturating or pulverizing. The letters contained within a band, ornamented, are IVI. V., no doubt the name of the maker, a portion being broken away. A portion also of Samian ware much ornamented has the maker's name, or that of the figure represented, but is, unfortunately, broken, and the only clear and well-defined letters are RV.; but a nearly perfect Samian vase has the potter's stamp, A. POL. AVSTI. These are the last discoveries, 4th January, 1876.

About two miles distant from Charterhouse in the direction of Wells and upon high ground, but situated in a small hollow on the top of Mendip, is Priddy, where are many old workings of lead and calamine. This parish is about five miles distant from Wells, and separated by a small rivulet, which forms the boundary between the two parishes. The church of Priddy retains all its pre-reformation features, and has undergone no change by restoration since mediæval times. The screen, pulpit, stone seat round the walls, all remain the same, and we can only regret that the damp and dust have been allowed to accumulate, and do the work of desecration. Were it not for this the church would be most interesting to the Ecclesiologist, and with a little care and judicious outlay might be made a model parish church. When the Club visited Ubley two years since, that curious and interesting church was in a very similar state, but now it has been redeemed from its forlorn condition, the square enclosures within it removed, and the walls and windows repaired, and it stands forth as beautiful as in early days; such is the change effected by judicious restoration!

I have mentioned Priddy as a point well deserving the attention of the Club on account of the archaic character of the church. At Priddy are also to be seen very curious circles of earth and stone, also the Barrows which I mentioned in a previous paper. There is a mediæval bell within the church tower, as there is also at Ubley. Somersetshire is rich in *Mediæval bells*. Mr. Ellacombe has just published "The Church Bells of Somerset," and in this valuable work he gives a list of all the church bells in the county, as he had previously done for Devonshire. These are arranged according to Parishes, in alphabetical order. The Parish, the dedication of the church, and then the bells, with their particular Legends, or the bell founders' or churchwardens' names, under whose care they were first placed in the Tower or recast. "More than 240 of these," says Mr. Ellacombe, "are mediæval or consecrated bells, the very bells which in days gone by daily sounded at Mane, Meridie, and Vespere, and still call the parishioners to worship. . . . These bells are beautiful in their design and lettering." Last year at a meeting of the Literary Club I called attention to a Legend on one of them, which had attracted the notice of the Archæological Association, when they visited Bristol—the Sancte bell at Clapton in Gordano—"Signis cessandis et servis clamo cibandis,"—on the sound bow. Since then I have carefully examined the Legends of all the Somerset pre-Reformation bells, given by Mr. Ellacombe, and find several in the Mendip district. Thus at

PRIDDY (Church dedicated to), S. Lawrence, there is a pre-Reformation bell, with the Legend—"Campana Sancte Johannes Baptiste." The bell is dedicated to S. John the Baptist.

UBLEY, S. Bartholomew, Legend—"Sancta Anna." Dedicated to S. Anne.

CHURCHILL, S. John Baptist, Legend—"Sancta Maria."

LOCKING, S. Augustine, Legend—"Iste est Johannes."

BREAM, S. Bridget (three ancient bells), Legends—

1.—"Sancta Michael."

2.—“Quos convoco Virgo Maria.”

3.—“Sancte Dionysi ora pro nobis.”

RODNEY STOKE, S. Andrew,

1.—Sancta Maria ora pro nobis.”

2.—“Sca Katarina ora pro nobis.”

3.—“be al prais to God.”

4.—“Sancta Luca ora pro nobis.”

WOOKEY, St. Matthew,—Jesus nazareus rex judeorum.

LOXTON, St. Andrew,—

1.—Sancte Nicholaie.

3.—Beata Virgo Katerina.

The Sancte bell at Wrington, with its beautiful bell cot has been omitted by Mr. Ellacombe. The Legend is “Sancta Maria.”

Thus the Mendip district is rich in pre-reformation bells.

Much may be gathered also from the old tombs and monuments in these churches. Many of which are very perfect, as at Rodney Stoke. The churchwardens accounts also go back to a remote date, and deserve careful examination. I have been favoured by Mr. Barnard with extracts from those at Yatton which go back to the year A.D. 1445.

At Blagdon they reach the same early date. By means of them the changes wrought in our churches by the Reformation may be clearly traced, and we are enabled to see what their condition was prior to that period. Were I to make extracts it would extend this paper to too great a length, but I have already given a specimen of the entries in my own parish books. Through the kindness of a friend I have been favoured with an ancient perambulation of the parish of Wrington, which is contained in the Glastonbury chartulary now in the library at Longleat, and is to be published, as I understand, in the proceedings of the Somerset Archæological and Natural History Society. The date is about A.D. 1205, but I am unable as yet to identify the names of the places, except the river, which was then called the Wryng. The name by which it is now known is the Yoe, a name very common

to rivers in this locality, but the village itself has preserved the *ancient* name of the river, and the doubt about the origin of the name of "Wrington" is now set at rest.

This is an instance of the value of preserving ancient documents. Should more light dawn upon my endeavour to identify ancient boundaries, and to trace the gradual change of the nomenclature of places, I shall hope to lay the result in due course before the Club, more particularly if any thing of historical value should appear ; in the mean time it is encouraging to find that where an effort is made to elucidate parochial history, discoveries in libraries and public depositories tend to encourage and reward the endeavour.

Summary of Proceedings for the Year 1875-6.

MR. PRESIDENT AND GENTLEMEN,

The records of the Club ought to begin with an account of our Anniversary dinner ; but, inasmuch as the 18th of February again passed away without the usual celebration of our nativity, I have only to note the fact of an unsuccessful attempt having been made by the Committee to arrange a dinner later in the season. Should, however, a summary of our doings during the next year be written, it is hoped that this omission will be repaired, and that the occurrence of a successful dinner held this evening will appear therein.

It is not given to every Secretary to congratulate his Club upon some important discovery in Natural History, Geology, or Archæology, your Secretary then is no worse off than others in this respect ; he cannot congratulate the Club upon its attendance at the evening meetings. By a resolution passed at the last Anniversary a grant of £3 was made for tea during the evening ; this was supplemented by an equal grant from the Literary and Philosophical Association, as a slight acknowledgement of the

privilege enjoyed by their members of attending the meetings of our Club. But even this has proved of no effect in creating an increased attendance of members, though the outside public have shown a greater interest and helped to make up an audience.

The evening meetings of last session were brought to a conclusion by the usual *conversazione*, which was held on 17th of March, when Mr. Broome, whose fame as a mycologist is not confined to Bath, made another contribution respecting the Fungi found in this neighbourhood, this being his third paper on the subject (*vide p. 304*). An apt quotation from Linnæus, respecting the copious materials spread around us by Nature whereby our knowledge may be so vastly increased, brought his remarks to a close. The nature of the subject, as the chairman Dr. Hunter said in thanking Mr. Broome, precluded much discussion. Mr. Ekin, however, remarked that a great many things had to be learned before we arrived at a complete knowledge of Nature's laws. As an instance he stated that he had been lately watching with considerable interest an elm tree* in the Park, which though stripped of at least six feet of its bark, for the last two years had continued to blossom, and was now about to put out leaves; thus tending perhaps to upset some current theories respecting vegetable physiology. If there was much to learn respecting ordinary plants, much more was there to learn respecting the mysterious order of the fungi.

The Secretary having read his summary of the Club's proceedings for the past year, Dr. Hunter brought forward a poetic incident in the life of Herschel during his residence in Bath, and then adjourned the meetings till the next session.

In arranging for the evening meetings during 1875-6, it was thought advisable to change the day and the hour, consequently the first meeting of the new session took place on Thursday, November 11th, at 7-30, when the members present were glad to

* Since cut down.

see their President able to appear again amongst them and read an elaborate paper on the "Results of Ten Years' Meteorological Observations at the Bath Literary and Scientific Institution" (*vide p. 205*). In the discussion which followed, the speakers alluded to the amount of labour involved in working out these results which they considered of great value in determining the climate of Bath, its temperature and rain-fall.

The evening of December 9th was given to an "Excursion Talk: A Story of Kelston House" by Dr. Hunter, who, in his communication, attempted to represent the thoughts and conversation of a party of the Club on a visit to Kelston. As may be expected, the brilliant and pleasant Sir John Harington was a principal figure of the evening. The writer quoted largely from the *Orlando Furioso*, and comparing some of the passages with the Italian thought that Harington had done bare justice in some places to the astonishing vigour of the original, but had nevertheless produced an unmistakeable reflection of Ariosto.

In the advertisement to the reader, prefixed to Harington's *Orlando*, the author says, "As for the pictures, they are all cut in brass and most of them by the best workmen in that kind that have been in the land this many years; yet I will not praise them too much, because I gave direction for their making, and in regard thereof I may be thought partial." And there is more to the same purpose. Yet it would be an error to suppose that the designs are original; they are Porro's, and were in use in Italy at least so late as 1730, the date of the great Venice folio.

The *Nugæ Antiquæ* and the epigrams afforded some characteristic anecdotes, choice being made of such as had a local colour or were guides to the genius of the man, and attention was asked to the antitheses and puns which were stuffed in wherever room could be found for them, whether in a sermon or an epigram.

Dr. Hunter concluded by congratulating those present that they lived in an *old* country where nearly every parish might be found to yield some curious story, and urged the new members

to examine, arrange, and prune the local traditions into consistent and credible history. In the subsequent conversation after tea.

The Rev. H. S. Sayce, who took the chair, Messrs. Green, C. Davis, Moore, Odgers, and Wright slightly extended the subject in various directions and the evening closed with a vote of thanks to Dr. Hunter.

The third evening meeting was held on Thursday, January 13th, 1876, when the Rev. Preb. Earle made an interesting communication, entitled "Historical Observations on Church Architecture in Bath and the Neighbourhood."

His object was, he said, to show that there have been only two very limited periods of church building in this district. The first began with the building of the Norman Abbey by John de Villula, and lasted to the end of that generation. The present Abbey was in shape a reduced picture of this edifice the Nave of which covered the site of the present building, while the Chancel extended right across the Orange Grove, nearly to the rails of the Institution garden. The bases of the columns which carried the central tower could still be seen outside the east end of the Abbey. A number of churches in the neighbourhood were built at this time, *e.g.*, Langridge, Charlcombe, Twerton, Priston, Swanswick, Timsbury, Monkton Farley, Limpley Stoke, Englishcombe, &c., and described the traces which remain of the original structures. He mentioned the curious fact that Norman churches had two doors, north and south, directly facing each other, while the later custom was to have only a south entrance. He produced views of Monkton Farley and Limpley Stoke Churches, cut from the *Bath Herald*, and showing that they were entered from the north, and thus must be of Norman foundation. In the latter church the other door, though walled up, was still visible. He considered the present Abbey was a re-building upon the plan of the old edifice, though the prevailing Perpendicular fashion had ordered its details and given it the large windows, on account of which it bore the name of the "lantern of England." He therefore held that the second church building era had commenced in our own time when so many new churches and new foundations had been made, and he said this revival of zeal, after a lapse of seven centuries, was most interesting. The movement commenced with Bathwick Church, an interesting church, which held an historical position, for it marked the revival of Gothic art. In conclusion, Mr. Earle threw out with regard to the translation of the very ancient

Latin inscription (whether older than 11th century he could not say) at Farley Hungerford a valuable suggestion, which was warmly praised in the ensuing conversation by Dr. Hunter:

Muniat hoc templum cruce glorificans microcosmum,
Quæ genuit Christum miseris pace fiat asilum.

Mr. Earle said "microcosmum" is generally read "man," but he thought it was merely a substitute for "mundum" the world, put in to make the line scan. He said the stone was evidently the tympanum of the doorway of the Norman church of Wittenham, and he thought that the ancient symbol of a cross surmounting a sphere, which appears in the regalia, and again in the Church of Appolinaris in Italy, was originally set up over it, and that this was in the writer's mind when he wrote of the Saviour, "Cruce glorificans microcosmum;" which, if he was correct, would read, "He who adorns the world by the cross."

Mr. Talbot made some remarks amplifying Mr. Earle's list of Churches; and advised the Club to visit Corsham Church, as the proposed restoration would sweep away the most ancient portions of the structure. In answer to his query, why he considered Wittenham (which has long totally disappeared) to have been a Norman Church, Mr. Earle said

His authority on that point was "The Church Rambler." "The Church Rambler" (and he agreed with him) was of opinion that the stone was older than Farley Church, and that it came from Wittenham. The writer also afforded the information that there was once an older Church at Wittenham which had become merged in Farley. He had no other data for the natural conclusion that here was the Norman Church from which the stone came.

The Rev. Prebendary Scarth afterwards described his "Further Gatherings in Mendip." (*Vide p. 334.*)

The last evening meeting of the session, at the the Royal Institution on Thursday, was occupied by a paper from the Rev. H. G. Tomkins, on the "Ancient Stronghold of Worlebury." The numerous visitors to the flourishing watering place of Weston are but little aware of the remarkable camp which so picturesquely overlooks the villas surrounding it on all sides. Mr. Tomkins having himself been present when the hut circles were so carefully

explored by that indefatigable antiquary and enthusiastic camp-hunter, the Rev. F. Warre, and having made accurate drawings on the spot of the various "finds" then brought to light, was most fully entitled to assert his claim of having something to say on the subject. Though from time to time various short accounts have been printed in the Som. Archæological and Natural History Society's Proceedings, yet it was advisable that there should be a connected account given of all that was known on the subject. This Mr. Tomkins most ably accomplished. Commencing with an account of the entrance to Worle Hill by the Kewsteps, he proceeded westwards by a cairn of stones on the highest point of the hill called Pickwinner or Pickwynnard, till he came to the first line of defence consisting of a trench cutting across the hill from N. to S., and enclosing a space supposed to be for cattle. Beyond this came a series of ditches, the outer defence to the main ramparts, now an almost ruinous heap of stones, but formerly consisting of two strong battered walls of dry masonry. This masonry was of a very peculiar kind, similar to that of Dolebury Camp, near Rowberrow, on the Mendips, and quite unique in this part of the country at least. The peculiar facing of the wall was minutely described, consisting of stages in wavy lines, the convexity of one face corresponding with the concavity of the other, thus giving strength and solidity to the whole. Mr. Tomkins pleaded for the antiquity of its construction on the ground that in no single instance, whether amongst the vast mass of stones which form the ramparts, or on those that lined the bottom of the hut circles, has any tool marking yet been found. On the other hand as a set off to this, the remains hitherto unearthed consist principally of objects of iron, with here and there a bronze ring. A few flint flakes which were found are of no importance in connection with the age of the place. The only definite conclusion arrived at was that this fortress was pre-Roman. It might have been captured by Ostorius Scapula, and the weapons found might have belonged to his soldiers. Mr. Tomkins read

the capture of Caractacus as described by Tacitus as strikingly analogous with what he imagined the capture of Worlebury. He stated, without endorsing it, Mr. Warre's theory that the fastness was of ancient construction but abandoned, and that the iron weapons found proved that it had been captured and re-occupied by the Saxon in 577.

The discussion after tea was carried on by the Chairman, Dr. Hunter, who thanked Mr. Tomkins for his admirable paper, by Dr. Black, Messrs. Skrine, Ekin, and Winwood. A general feeling was expressed that such a valuable relic of the ancient people should be preserved from the destruction which is quickly overtaking it at the hands of visitors and children, and that it should be one of the objects of antiquity included in the schedule of Sir John Lubbock's Bill which is again to be brought before Parliament. Time did not allow of the reading of the Secretary's summary of the year's proceedings, as announced.

EXCURSIONS.

Tuesday, May 25th.—Excursion to Burrington Combe, Charterhouse Mines, and Cheddar Cliffs.

About twenty-one members left Bath at nine o'clock a.m. by train for Bristol; and having taken a "break" from the station, proceeded direct for Burrington, crossing the high table-land called Broadfield Down and descending into the beautiful Vale of Wrington at Redhill. The morning was misty, and the clouds hung upon the Mendips preventing the eye from embracing at one view all the varied landscape, which, bounded by the Mendip hills and the Quantocks in the far distance, extends across the Severn and includes the bold pomontory of Brean Down, with the Islands of the steep and flat Holmes and the coast of South Wales beyond. By the time the party reached Burrington a little before noon the sky had become clear, and seemed to promise a fairer view from the top of Mendip.

At Burrington, the party having dismissed their "break," were met by the Vice-president, the Rev. Preb. Scarth, and most

hospitably received by the vicar of Burrington, the Rev. W. B. de Moleyns, who had generously provided refreshments for the party. Having admired the picturesque and beautiful grounds of the parsonage where the party seemed disposed to linger long, and examined the Church with its beautiful perpendicular stair turret and the carvings on the shields designed as supports for the timber roof of the side aisles (which roof, alas, only now exists over the two most eastern portions, having in years past been superseded by a plain ceiling of lath and plaster), the party proceeded up the combe. This beautiful gorge in the Mendip reaching for nearly a mile and winding in an oblique direction, exhibits the Limestone strata dipping almost perpendicularly. In passing up the combe, the opening of which is crowned by a small camp which seems in Roman times to have protected this pass, the site of no less than four caverns in the Limestone rock were pointed out. The names of these, all of which have been examined and described by Prof. Dawkins and Mr. Sandford, are Aveline's hole, Whitcombe's hole, Plumley's den, and Goatchurch cavern. In the absence of the Secretary of the society (who usually undertakes the geology of the district over which the Club travels), a few words were said by the Vice-President on their contents and the remains found in them. The party also witnessed the obstruction formed in the combe by a sudden downfall of rain in the autumn of 1871, when, by the accumulated force of the water descending from one of the lateral valleys, the road had been choked and covered with a mass of *débris* which required several days' labour and much cartage to remove.

The party soon found themselves on the summit of Mendip, where the view stretches from the Channel and the mountains of Wales eastward to the Cotteswold hills, and to the high land over Bath and Bathford. Here a brief account was given of the geological strata which had been traversed, and the party passed on in the direction of Charterhouse; before descending the hill to the smelting mill they paused to examine the Roman Amphitheatre

lying on the south side of it, and overlooking the field called the "Town Field," where many Roman remains have been found among the cinders and scoria of the old Roman workings. Quantities of ancient slag here lie under the turf, and with this are the remains of Roman fictilia, portions of lead and iron, showing how much industry was spent in this locality in days as early as Vespasian and the Antonnines. The party were here met by the agent of the mines, Mr. Rogers, who courteously showed them the collection of ancient remains made at the smelting mill, and then conducted them past the series of washings, and the ponds or pans for storing the refuse, till they entered the Cheddar pass.

To those who had not before seen this grand winding chasm, but who had visited foreign sights and scenes, the pleasure and wonder was not diminished by comparison with other passes. Time would not allow the party to examine the curious Stalactitic Cavern so much talked of, and which reveals the secret structure of many portions of our mountain regions.

The Church at Cheddar, so tastefully restored two years since, was visited under the guidance of the Vicar, the Rev. A'Court Beadon, who kindly explained the interesting features. But, alas, by this time the antiquarian interest of the Club was almost exhausted, and the members were few who listened to the pleasant explanation; most had betaken themselves to rest and refreshment at the railway station, where an excellent dinner had been provided by Mrs. Cousins. Mental effort having produced much bodily exhaustion, and the keen air of Mendip with six or seven miles walk having added to the fatigue, it needed an hour before strength was sufficiently restored to thank very cordially the guests who had so kindly aided the party by the information afforded at different points of the walk. This having been duly fulfilled and responded to very cordially, the party returned to Bath by an evening train, much pleased by the day's excursion.

Mr. Broome has kindly sent in the following notes of the botanical part of the day's excursion :—

It was asked on the excursion of the Field Club on the 25th inst. to send a note of any plant that might turn up on our way which is not of every day occurrence. At Cheddar nothing was seen beyond the usual plants of that locality; it was satisfactory, however, to see the pink growing freely on the rocks just out of reach of passers-by. *Polypodium calcareum* was in great luxuriance, happily too abundant to be exterminated by collectors however greedy they may be. *Thalictrum minus* also was conspicuous from its foliage, so like that of an *Adiantum*, but it was not yet in flower. *Cistopteris fragilis* was also there, though not very plentiful. On the heaps of rubble about the lead workings, *Thlaspi alpestre* was growing scattered about; this plant seems to be, so far as I can discover, new to Somersetshire, and it is somewhat singular that it occurs about the lead workings also in Derbyshire, as I am told by Mr. Blomefield; it does not appear that it could have been carried to the Mendips from any other locality, as no material for use in the works has been taken to the place; it may, therefore, be fairly considered to be indigenous. We passed a field full of Orchises of various colours on our way to Burrington, but there was no time to inspect them closely. It is observable how these plants abound in certain confined localities. A single meadow often contains great numbers of them, of perhaps four or five different species, while adjoining fields scarcely yield any. In a meadow near Batheaston there occur *Orchis mascula*, *O. maculata*, *O. morio*, both of various colours. *O. conopsea*, *O. pyramidalis*, *Habenaria viridis*, *Ophrys apifera*, and *Listera ovata*. The adjoining meadows yield a few of each, while in those a few hundred yards away scarcely one is to be seen. The soil of the meadow so rich in these plants consists of a fine sandy loam. I may mention also that *Nephrodium*, *Oreopteris* and the dark-stemmed form of *Asplenium filix femina* were seen in Burrington Combe.

June 22nd.—Excursion to Caerphilly Castle.—This was a two day's excursion, and as the Secretary was prevented from accompanying the members, he is indebted to Mr. Henry Inman for the following notes :—

Sixteen members of the Club met at the Great Western Railway Station for the excursion to Cardiff and Caerphilly, and were joined by two others at Bristol. On their arrival at Cardiff, they were met by Mr. Drane, one of the most active members of

the Cardiff Field Club, who kindly acted as their cicerone during the excursion.

After luncheon, and securing quarters at the Royal Hotel, a visit was made by the kind permission of the Marquis of Bute to Cardiff Castle. On entering the gateway, Mr. Drane pointed out the traces of the buildings which formerly ran at right angles from the Gate-house tower to the Keep, and which have been lately uncovered. He gave it as his opinion that it was in one of the towers of these buildings that Duke Robert, of Normandy, was confined; and not in the Gate-house tower, according to the popular tradition, this latter tower being of much too late a date.

The members then ascended the new Tower which affords a splendid view of Cardiff, the headland of Penarth, and the valley of the Taff. The inhabited buildings of the Castle are undergoing extensive repairs and alterations, under Mr. Burgess, in the severest Mediæval style.

Leaving the Castle, the members walked by the banks of the Taff to Llandaff. The Taff is the beau idéal of a salmon river with one omission; there are no salmon. These have all been destroyed by the water from mines and ironworks.

The sight of the Cathedral placed on the right bank of the Taff is very charming, and the two western towers of different sizes, one crowned with a spire, give it a peculiar and rather foreign appearance. On the return to Cardiff, several members walked round the Docks.

In the evening there was a very pleasant dinner, to which nineteen sat down, and later on several of the members adjourned to Mr. Drane's to inspect some curiosities, while the others were introduced to the Cardiff Club, by the kindness of Mr. Bruce.

The next morning a start was made for Caerphilly. The Castle is situated in the centre of a wide basin, and was essentially a fortress and not a Baronial residence. It is of immense extent,

covering about thirty acres, whilst the Tower of London covers only a little more than twelve.

The water defences were on a most extensive and elaborate scale, and constituted the principle strength of the Castle, and it is evident that when the fortifications protecting the principle dam were taken and blown up, the fall of the Castle must have speedily followed. It is singular that there is no record of this event. Mr. Drane mentioned that the country people when speaking of anything as hopelessly lost, said, "It was gone to Caerphilly." No doubt an allusion to the rapacious habits of the garrison in former times.

From Caerphilly the members walked to Castell Coch, "The Red Castle," as it is called from the colour of the stone. The Castle, which is quite a small building, stands on the edge of a ravine, and is being rebuilt by the Marquis of Bute. When finished, it will hardly be a desirable residence, and all its picturesque beauty is rapidly disappearing. The clerk of the works, who happened to be there, produced and explained the plans and elevations of the Castle. The view from the hill above is very fine.

The members then descended to a small Inn at the foot of the hill, where a supply of broiled ham and eggs were not altogether unacceptable. The village rejoiced in the name of Tongwynlais. Some of the party then proceeded to the Pentyrch iron-works, about one mile distant, and then reuniting with the main body at the Walnut-tree Bridge Station, the whole returned to Cardiff by rail, passing the encampment of the Glamorganshire Militia on the way.

It should be added that the success of the excursion was chiefly due to Mr. Drane.

Mr. Broome writes that :—

The botanical results of the excursion of the Field Club to Cardiff and Caerphilly were very meagre; no plants of much interest occurred except in the dockyard at Cardiff.

Wahlenbergia hederacea (Reich.) was seen on the side of the track leading from Caerphilly to Castel Coch and *Rubia peregrina*, L. on the mountain limestone above the Castel. The single Rocket, L. grew in a hedge about a mile from the latter place, no doubt an escape from some garden. The lane near Caerphilly was beautifully fringed with ordinary ferns; *Athyrium filix fœmina*, Berch., *Polystichum aculeatum*, Roth., *Lastrea filix mas.*, Presl. *L. oreopteris*, Presl. sparingly, and *Blechnum boreale*, Sw.

The plants observed in the Cardiff dockyard were *Trifolium maritimum* Huds. and *T. resupinatum*, L., *Lepidium ruderalis* L., *Erysimum orientale* Br., *Caricus tenuiflorus*, Curt., and *Diplotaxis tenuifolia* D.C., which was most disagreeable in its odour. A single plant of *Centaurea calcitrapa*, L. was also met with. The time bestowed on the dockyard was not sufficient for a proper investigation of its flora, or probably other local or uncommon species would have occurred.

Rosa villosa L. or *tomentosa* Sm. was conspicuous in several places around Cardiff for its deep red blossoms and its fragrant and glandular leaves.

Equisetum sylvaticum, L. is common in that district; which, though abundant further north, is rare or unknown about Bath. It is, perhaps, the most elegant of the genus, and very ornamental when well grown, but it spreads to such an extent beneath the surface of the soil as to become a pest in gardens.

September 7th. Excursion to Avebury and Silbury Hill.—By a resolution passed at the Quarterly Meeting in July an alteration was made in the day of this Excursion from the 28th to the 7th of September.

Notwithstanding the associations which the very name of Avebury calls up only thirteen members of the Club assembled at the rustic little station of Calne for this the fourth and last excursion. After a short preliminary arrangement with mine host of the Lansdowne Arms we were well away for the Downs; once through the suburbs of the little town, the rounded outlines of the chalk hills appeared on our right, and the Cherhill White Horse, work of the last century, stood forth sharply defined by the morning sun in all its rampant obtrusiveness. Passing under Lansdowne Column which rises out of Oldborough Castle, one of the many camps studding the brow of the chalk escarpment in

all directions, the first tumulus on the right came into view ; and one after the other they rose to sight until Silbury Hill, the great father of all the tumuli, showed his head above the rising ground throwing all his pigmy offspring into insignificance by his mighty proportions. Turning to the left off the main road we see the first indications of the neighbourhood of antiquities ("so exceedingly old," as Aubrey says, "that no bookes doe reach them") in the shape of two large stones, a portion of the now nearly destroyed Beckhampton Avenue. Right and left as the village is entered we see the walls composed, and the houses entirely built, of cyclopean work ; sufficient evidence if history were silent that other spoilers besides farmers Green, Griffin, and Fowler had a hand in the destruction of Avenue and Circle. Leaving the "break" at the Red Lion Inn, we first of all ascended the Vallum at the N.E. corner and obtained a general view of the plan of the stones. The Secretary here stated that the lofty Vallum on which they were standing, with its ditch on the inside, enclosed a large circle or oval of stones which surrounded two other similar but smaller ovals at the N. and S. sides. From their centre issued, about S. and W., two Avenues leading to Beckhampton in one direction and Kennet in another. The stones of which these remains were composed were obtained from the immediate neighbourhood and are called 'Sarsen stones,' a silicious sandstone of Tertiary formation, which might still be seen scattered over the neighbouring valleys. Their position here was accounted for by their consistency being sufficiently hard to resist the denuding power which had swept away the surrounding matrix of Bagshot sand, and left these large masses stranded on the chalk floor ; that they had been subject to the wearing action of water might be seen in their generally rounded edges and smooth exterior. Walking along the top of the Vallum to the Church lying immediately outside it to the W. the members were conducted through the fine Norman S. porch by the Vicar, the Rev. Bryan King. Before entering, however, a plain iron cross in the church-

yard attracted the attention of the members. On it was the record that "Reuben Horsall, Parish Clerk and Antiquary, fell asleep Jan. 1727;" honourable mention by the appreciative hands of the Vicar of an antiquary who in his day resented the ruthless destruction of these grand old stones. Mr. King was evidently at home in his own Church, and pointed out how formerly the N. and S. aisles were divided off from the Nave by low Norman arches, traces of which were seen in remains of shafts with Norman capitals on either side, replaced since then by arcades and piers of Inigo Jones pattern, somewhat similar to those at Calne Church. The Norman Font, composed of coarse Oolitic stone, was ornamented with scroll work round the rim and rudely interlacing round arches cut in relief, which gradually left the perpendicular until on one side they looked, as the Vicar said, like a badly-written schoolboy's copy. On the east face was a figure of an ecclesiastic, with a pastoral staff in one hand and an open book in the other, treading on a winged dragon or serpent. Mr. King informed the members that one of the junior Masters of Marlborough had sketched a sister font at the Cathedral of Treves, and Mr. Talbot suggested that the figure might represent St. James Bp. of Jerusalem, to whom this Church was dedicated. Passing through the roughly cut "squint" which might be of 15th century-work, the Decorated windows in the Chancel were much admired; the enlarged one on S. gave rise to discussion; Mr. Talbot considering it might have been the work of the Perpendicular time in imitation of Decorated work; Mr. King thinking it of very much later date. After examining the outside, especially the hood moulding, the general conclusion was that Mr. Talbot's conjecture was right. On the E. wall of the Chancel a brass tablet records the death of a member of the Truslow family in 1593. And a portion of 15th century open wood work attached high up on the W. wall of the Chancel indicates that a screen formerly ran across the Nave below. To the W. of the Church stands an old Manor House, gable-ended and picturesque; the

two northernmost gables are of 15th century work and originally formed a portion of a Convent connected with some foreign community. Before leaving the Churchyard on the N. a sycamore tree, said to be the finest in Wiltshire, was noted and attention called to the Chancel buttresses, evidently original Decorated work. The Chancel walls have been raised, and here again the circles afforded the quarry whence materials have been used for this purpose. The points of interest connected with the Church being now exhausted the Vicar lead the way to the two upright stones, remnants of Stukeley's Adytum or cove of the N. circle. The remains of the third stone, destroyed in 1713, Mr. King said he had seen, consisting of chips mixed up with burnt straw and faggots, showing the means used for its destruction. The taller of the two now standing, he said, measured eighteen feet out of the ground and was the highest of all the stones ; it was probably sunk some three feet into the solid chalk and kept in an upright position by blocks of 'Sarsen stones' jammed in at the base, as was probably the method with all the other stones. The members thanked Mr. King for his kindness and valuable information, visited the remains of the southern circle and left the Vallum, which unlike most other military works has the ditch on the inner side, by the Kennet Road ; there was a sufficient number of stones remaining here to convince even the most sceptical that they once formed an Avenue.

An instance of local pronunciation may be worth recording ; an old man returning to his midday dinner from the fields, divining our object, told us that we should find many more old stones on the road, and that the name of the hill intervening between us and Silbury was "Weedon ;" Stukeley's Weedon, and the Waden hill of the Ordnance Maps. After tracing the stones on either hand and crossing the Kennet stream, a traverse was made to the long barrow on the top of the hill immediately south of Silbury ; here the first halt of the day was made. Seated on one of the many 'Sarsen stones' now lying

confusedly tumbled one over the other, which formed the chamber at the east end of the barrow, the members discussed their lunch, and mid the fragrant incense from the tobacco plant which rose up around thought on the strange people who had buried their dead beneath ; whilst Mr. Long's admirable pamphlet, "Abury Illustrated," was consulted. An enthusiastic member was seen to cross the rising ground and descend into the valley below, where lay the "grey weathers," scarcely distinguishable from the flock of sheep grazing amongst them. So delighted was he, as he afterwards said, with the sight that he could have remained there until evening examining their lichen-covered backs. After enjoying the refreshing breeze for a short time the walk was resumed across the intervening fields, whence some flint chips of a rather doubtful character were gleaned, to the foot of Silbury, the big mound. The ascent having been made, the Secretary called the attention of the members to this the most remarkable feature of the surrounding scene, and the largest artificial mound in Great Britain. "That it was an artificial mound, he said, was made evident by the excavations of the Archæological Institute, in 1849, which disclosed the fact that the chalk rubble and flints, of which the hill was composed, rested upon the original surface, in fact upon the old turf itself; which was found quite black with the undecayed moss and grass amongst which were the dead shells of the neighbourhood. That it was a sepulchral mound might perhaps be a little harder to prove, for though no indications of interment had been found during the only two examinations that have hitherto been made, yet there was still a possibility that a more scientific use of the spade than that of some five-and-twenty years ago might reveal a burial, to be sought perhaps not so much in the centre as nearer the circumference ; and he ventured to hope that the noble proprietor of the mound, Sir John Lubbock, to whom antiquaries were so much indebted, would at some future time settle the question for good, as he had already done with regard to the Roman road. There stretching away on their right hand

might be seen, by the lighter colour of the soil, the straight line of road running directly for the Mound. Did it then run immediately beneath the hill, and was it therefore post-Roman, as Mr. Fergusson suggested? Nothing of the sort; Sir John Lubbock, wishing to set this speculation at rest for ever, traced it with pick and spade along its straight course till near the foot of the hill, where it suddenly swerves south, passing round the base purposely to avoid it and resuming its direct course afterwards to the east. Thus the scientific use of the spade had corrected the unscientific use of the imagination; and the Mound was prior to the road, and Stukeley was again correct. But who the people were who excavated from the surrounding soil and heaped up this huge pile, covering its 28 acres, and as the aneroid that day gave it, rising some 140 feet high, none could tell. That they did not belong to the iron age might, the Secretary thought, be taken as sufficiently proved." Some rich grass meadows alone separated the members from their dinner; these were soon crossed, and ample justice done to the excellent mutton, &c., that mine host of the Red Lion set before them. The "break" rolled pleasantly away over the downs to the old wooden barn at Cherill, where a halt was called whilst Mr. Talbot explained the construction of the roof of this curiously wood-pannelled 15th century building. By the time Calne was reached, the inhabitants had closed their shops for the day; the open Church however invited an entrance. The somewhat curious Norman capitals of the Nave, the re-construction of the Chancel and tower by Inigo Jones, the latter a very creditable piece of Perpendicular work for that eminently classic compiler, and the signs of a well-to-do look which abounded on all sides, brought the thoughts of the members from præhistoric archæology down to the more prosaic affairs of every day life; and they came to the conclusion that pig killing was a profitable business.

Worcester and Great Malvern.—The equinoctial gales which broke up the fine warm weather of the early weeks in September,

probably accounted for the small muster (fifteen in all, eleven members and four visitors) which surrounded Canon Barry in the Nave of Worcester Cathedral about noon on Sept. the 28th. A few copies of Mr. Severn Walker's useful little paper on "The Architectural styles and events connected with the Cathedral Church of S. Mary," having been kindly placed in the hands of the members by the Canon, they were at once conducted by him to the west end of the Nave, whence a general view of the Cathedral might be best obtained. Here the various architectural details were pointed out, and a short history of the building given. From this it appeared that the origin of the present edifice was somewhat doubtful; though Bishop Oswald was supposed to have built a Cathedral here at the end of the 10th century, it is doubtful whether any remains of this at present exist. A century later, however, Bishop Wulfstan, A.D., 1089, completed a new building which extended as far as the tomb of King John in the present Choir. The two western bays of the Nave bore evident traces of the work of this period, as also did the Crypt and the interior of the Chapter-house. As regards the date of the Crypt we have documentary evidence, for Bishop Wulfstan appointed a Synod to meet "in the Crypts, which (he writes) I have built from the foundation, and, by the mercy of God, have since dedicated;" this was written 1092. The chief architectural points of interest were stated to be the Transitional character of the work. On the north side of the Nave was the Decorated work of the 13th century; on the south the passage by almost insensible degrees from the Decorated to the Perpendicular of the 14th century. The insertion of the extra rib in the groining of the roof with its curious termination was claimed by him (the Canon) as a feature of this Transition period which had hitherto been unnoticed.

Passing up the Nave paved with black and white marble, the gift of Lord Dudley, the magnificent modern pulpit, also the gift of this nobleman, excited universal admiration. If the Grecian

pattern of the pavement, said to be a reproduction of that at Amiens, appeared incongruous in a Gothic building, there was but one opinion that this chaste work of art, with its exquisitely-carved pannels, representing Gospel scenes and its harmoniously-blended Alabaster and marbles of different colours, was in complete character with its surroundings. A descent through the east wall of the Transept, which showed some early Norman work, possibly that of Oswald, lead into the Crypt. The simple capitals, with their square abaci and plain flat vaulting-ribs, covered with probably the original plaster, indicate the early date of this portion of the building ; and the pretty effect caused by the intersection of pier and arch, since the intervening walls have been taken away, renders this one of the most interesting portions of the building. At the east end of the Crypt on the north wall, Dr. Barry pointed out the remains of colouring, amongst which the arms of Clare, Duke of Glo'ster, were plainly discernible. Ascending to the Transept and passing into the choir of early English date, the chief object that arrests attention is the tomb of King John ; buried here A.D., 1216, before the high altar which then stood in the Norman apse, and between the tombs of SS. Oswald and Wulfstan, according to his request, he remained for ages covered by a simple slab of Purbeck marble, until in subsequent times, supposed to be at the date of the erection of King Arthur's Chaapel adjoining, it was thought necessary to represent him in full length effigy lying between his favourite Bishops. Since then the very questionable taste of the Board of Works has lately entirely covered the figure with the brightest of gilding. The Chantry Chapel on the south, built in 1504 for Arthur Tudor, Prince of Wales, son of Henry VII., was next entered. As the last Chantry Chapel built in England peculiar interest attaches to it. The east wall is covered with sculpture which has been defaced, and the central group is difficult to make out ; apparently, two angels are bearing up the body of our Lord. The whole interior and exterior is profusely

ornamented, and the groining with its two curiously-contrived straight projecting ribs marks the decline of style. A large Purbeck marble altar-tomb stands in the centre. After admiring the Alabaster reredos, the party descended into the Lady Chapel. On the north wall is a tablet with the following record of the death of the sister of Bishop Ken :—

“**Ex. terris**

M. S.

Here lyeth buried soe much as could dye of Anne the wife of Isaak Walton,
Who was

A woman of remarkeable prudence and of the Primitive Piety, her great and general knowledge being adorned with such true Humility, and blest with soe much Christian meekenesse as made her worthy of a more memorable

Monument.

She dyed (alas that she is dead !) the 17th of April, 1662, aged 52.

Study to be like her.”

The Lady Chapel is of the same style as the choir, and 64 ft. in height. Several old tombs were pointed out, but some amount of uncertainty appears to exist as to the true names of their former occupants. Returning back again into the Nave, a circuit was made of the Cloisters ; with the exception of some original Norman work of the Transition period existing in the west passage, all the rest is of Perpendicular date. A slab, with the single word “*Miserrimus*” cut thereon, indicated, as the Canon said, the “wretchedness of disappointed loyalty” which some friend had recorded of an old Jacobite clergyman. The lavatory on the west side, and some curious bosses representing the history of Jesse, seen sitting under his vine in a headdress of a very modern type, and much resembling a chimney-pot hat, were duly noted ; and now probably one of the most unique architectural features of the day, the Chapter house, was entered. The lower part is surrounded with plain round-headed recessed seats, with an arcading above of interlacing circular arches, the roof being supported by a single round shaft, from which spring plain round ribs forming the groining ; the whole, with the exception of the

upper part and the Perpendicular windows, being of Transition Norman date and unique in its simple elegance. It remained now only to see the remains of the Guesten hall, consisting of an east wall pierced by two Decorated windows of most elegant design, and the Refectory whither the king's school was removed in 1641. After some little knocking at the door of the latter entrance was obtained, and the master courteously interrupted his duties to point out the mutilated sculptures only last year discovered on the east wall of the Refectory. These consisted of a very large figure of our Lord in a quatrefoil, with the symbols of the Evangelists at the four corners, and on either side two niches of later date. Canon Barry, before handing over the party to an official with instructions to show them the clock chamber, was cordially thanked by the Secretary in the name of the Club for his courteous guidance during the morning, and for the instruction they had received from his remarks. The clock, carillon machine (constructed to play 28 tunes), and the peculiar triangular-shaped trunion of the great tenor bell were the last things visited; and the Rev. H. N. Ellacombe, one of the members, dwelt with justifiable pride on the recorded fact that his father, of bell celebrity and then eighty years of age, had been the first to toll the great bell single-handed, after the improved method of hanging had been adopted.

Having left the Cathedral by the south door, a short walk took the members to the porcelain works of Messrs. Bins and Co. To those who had not seen the process before, the various steps by which the kaolin with its proper admixture of silica, carbon, &c. graduated from a creamy looking pulp into a dark coloured clay, and finally, when fresh from the kiln into a fine glazed porcelain, were very instructive. Every facility was afforded by the manager for the inspection of the different stages of the work, but perhaps the most interesting of all was the visit to the pattern room, where elegant designs were being painted on the china, by artists skilled in their particular department whether of bird or

flower painting ; or where patterns first lithographed on thin paper were transferred to the cup or plate, and then fixed by an ingenious process ; the paper having first been washed off. The sanctum of the manager was a sight to gladden the eyes of a china collector, for there, arranged in glass cases, were the *chef d'œuvres* of the manufactory from the very earliest times to the present, giving a complete history of its rise and progress in china. A short delay occurred in the show room in the selection of a few specimens for the home circle, and the members, after wandering about the town for a short time, found refreshment, if not rest, at the Star Hotel. Many were not sorry after somewhat indifferent accommodation, and being shaken in their beds during the night by the passing trains, to enter the quiet precincts of the Museum which had been kindly opened by Mr. Reece, the intelligent curator, half an hour earlier than usual, and under his guidance see an admirable local collection, which had evidently been arranged with some care. One feature was particularly worthy of notice. On the wall facing the first landing was painted a geological skeleton of the earth's crust, and on the top landing a geological outline of the different formations in the county of Worcester ; a most admirable idea, and one that might with advantage be imitated by all Museums, and especially by our Literary and Scientific Institution at home. It would be impossible in this short sketch to enumerate all the objects displayed from the arenicolites of the Cambrian beds, the oldest fossils in the neighbouring hills, up to a Chinese lantern. Mention however must be made of the admirable collection of recent shells, and the instructive series of rocks from the Malvern hills presented by Rev. W. S. Symonds, Dr. Holl, and others, exhibiting the different combinations of quartz, felspar, hornblende, augite, mica, &c., which enter into the composition of those primæval rocks. Before starting for Great Malvern, a rapid visit was paid by a few of the more enthusiastic to the Church of the Holy Trinity, close to Shrub Hill Station, to see the old roof of the Guesten Hall. This

old roof, said to be the finest 14th century roof now in Europe, was re-erected in the Nave of this Church in 1867, having been removed from its original position (by Vandals and Goths, some say) for that purpose. The day was well advanced when the admirably arranged Museum of Townshend house, at Great Malvern, was invaded, where Dr. Grinrod, its indefatigable and energetic proprietor, was waiting to point out its unique contents. In a glass case at the end of the room were specimens of the various rocks, eruptive and metamorphic, which compose the hills. Down the length of the room ran a double glass case, containing a series of specimens arranged stratigraphically, and showing the characteristic fossils of the district. Beginning with the end nearest the house were the older rocks, with a gradually ascending series to the topmost beds of the Palæozoic period. First came the "Holly bush sandstone," with its arenicolites and probable fucoids, the oldest unaltered rock in the district, and supposed to be of Cambrian age. To these succeed the "Black Shales," called "Olenus Shale," and characterised by a peculiar genus of Trilobites, named Olenus. Then comes an unfilled space, representing a gap or break in the succession of deposits, for the next rocks represented are the highly fossiliferous rocks of the May hill sandstone, or Upper Llandovery beds, so that all the beds are wanting here between the Olenus Shales (the Llandeilo or Lingula flags), and the topmost beds of the Lower Silurians, or the bottom beds of the Upper Silurian. Some very interesting blocks of May Hill conglomerate were pointed out as the oldest representative of this formation, and as indicative from its included water-worn pebbles of a period when the waves beat upon the rocks of these very old hills, and formed the palæozoic beach of the period. Dr. Grinrod, having dilated with pardonable pride on his truly unrivalled collection of British trilobites, having shown a rare specimen of *Encrinurus punctatus* with its spines complete, revealed the inside of a *Calymene*, the many-clustered eye of a *Phacops*, and many another peculiarity of

these oldest genera of crustaceans, conducted the party to the hills, passing on the way the fine old Priory Church. Entering through the door at the east end beneath the Perpendicular window, and rounding the apsidal termination of the Choir, the architectural peculiarity of massive round Norman piers and light Perpendicular windows strikes the visitor at once. Dr. Grinrod's son kindly undertook the explanatory part, and was found quite as well up in architecture as his father in geology, and a pleasant half-hour was spent in listening to him bringing out the beauties of the truly magnificent stained glass 15th century windows. The history of St. Werstan, the monk who fled from Deerhurst and founded the earliest Saxon Chapel in Malvern, and that of St. Wulfstan, the last Saxon Bishop of Worcester and connected with this Priory, was there in the storied panes of the north side of the Choir; there in the south Chapel was the curious "Creation and Deluge window," said to be the oldest glass in the Church; on that pier was inserted a tile with the date 1455; few places can show such a variety of encaustic tiles, the delight of Pugin. The Norman features were pointed out in the Tower piers, at the base of the apse, in the narrowness of the south aisle, and the Syenite of the Malvern Hills which filled in the space between the Norman arches and the Clerestory windows; the Perpendicular work, in the squared ashlar above, and thus the various details were brought out; but the Dr. was seen rather impatiently handling his hammer so that an exit was made towards the hills. St. Ann's Well visited on the way and the pure sparkling water tasted, after a little hesitation on the part of some of the elders the Worcestershire Beacon was fairly breasted and scaled; the Secretary bearing away to the right with the Dr. to see "Miss Phillips' Conglomerate," by no means the least interesting feature of the day, to him at least. After a short halt at this old Silurian beach a quick return was made to Townsend House, for Dr. Grinrod's kindness was not yet exhausted, refreshment was laid out and the members must partake of it.

Cordial thanks were returned to their host and Bath was reached in due time.

April 28th, 1875.—For the following notes on a *bye-excursion* to Sodbury, the Club is indebted to Messrs. Ellacombe and Talbot. The weather was very favourable for the excursion, and the programme was carried out most satisfactory. Twenty-six members joined the Excursion. The first stage was by carriages from Bath to Cross Hands; here the party was met by Rev. J. Blackburn, Vicar of Horton, who conducted them to the fine Camp that lies between Cross Hands and Old Sodbury, and read them a short paper on the history of the Camp. From this it appeared that the Camp is of undoubted Roman work, 900 feet long and 600 wide, protected by a double ditch and agger on three sides, the fourth side being sufficiently guarded by the natural steepness of the ground. There is one entrance on the east, there are also two others on the north and south, but these are now supposed to be only made for agricultural purposes. The name "Sodbury," or the South Camp, distinguishes it from the "Castle Camp," a mile to the northward. It seems to be one of the camps that Tacitus mentions as formed by the Proprætor Publius Ostorius (A.D. 51) to protect the sides of the Severn from the incursion of the Silures. "Detrahare arma suspectis, cinctosque castris Antonam et Sabrinam fluvios cohibere, parat."—*Annalium Lib xii. cap. 31.* The Camp commands a magnificent view on the southern Vale of Gloucestershire; it was afterwards occupied by Queen Margaret, and then by Edward IV. previous to the battle of Tewkesbury. A few Roman coins have been found, one of which is said to have given the name of Cross Hands to the Inn.

From the Camp the party descended to the ruins of the ancient Church of S. Adeline. Of this the only remains are the tower doorway and buttress and two grand old yews, now commonly called Tyndale's yews. The remainder of the materials were used in the building of the New Church of Old Sodbury in a more convenient

place. There is also a most magnificent beech close by, well worthy of record by a Natural History Club. It was generally allowed to be the finest known to any of the members. By the kindness of the owner, Mr. Hartley of Lye Grove, the members were admitted into the fine old hall of the Manor House adjoining, and were again instructed by Mr. Blackburn in the history of the building. It is one of the oldest private buildings in England, dating originally from the 14th century, but owing most of its present achitecture to Sir John Walsh, who, having married a daughter of Sir Robert Poyntz, and having received the Manor from Henry VIII., settled here with his family. The great interest of the house is that it was for some time the residence of Tyndale, the translator of the New Testament. He was tutor in the family of Sir John Walsh, and it was at Sodbury where he first resolved to translate the Bible in the English language. This resolution being known, his life was in danger, and compelled to leave Sodbury, he went to London, and from thence to Homburg, and Worms, and was put to death at Vilvoorden, near Brussels, in 1536. But before his death, he showed his interest in his native county by preparing a special edition of the New Testament for the Gloucestershire ploughboys, conforming the spelling to their rude pronunciation. A copy exists in the Cambridge University Library. From the family of the Walshes the property has descended through the Stephens and Pachters to the family of Hartley.

After a little lively discussion on certain points of architecture, the party went through some pleasant fields to the Rectory of Old Sodbury, where they were met and hospitably greeted by the Rector, the Rev. R. S. Nash, who, nothing daunted by the "*esurientum magna caterva*," soon set them all down to a substantial luncheon, to which full justice was done. Here the party separated, part returned to their dinner in Bath, but the larger number visited the Church of Old Sodbury. This was thoroughly restored about 17 years ago, and both in its beautiful position

and its thorough order is a good type of an English country Church. There is a very curious old oak monument in a recess, much worn, and probably of the 12th century.

Thence they walked to Chipping Sodbury, where they were met by the Curate, Mr. Graham, in the absence of the Vicar, and with him visited the Church, which has been beautifully restored by Street, and has a very remarkable pulpit found in the thickness of the wall. Then they visited the Town Hall, where are the remains of a fine old timber roof of the 15th century which has been badly restored. It contains also a most wonderful chest of great age and size. It is 11 ft. long, 3 ft. wide, and 2 ft. 6 in. deep, and so bound with iron that it may almost be called an iron chest with an oak lining. It contains the Town records, but only a few; the majority having been burnt about 40 years ago. In the garden of the residence of the R. C. Priest are the remains of the Old Market Cross, which formerly stood in the street. It was most courteously shown by his reverence, and consists only of the base and shaft. Chipping Sodbury is a good instance of an old English country Market Town, and is probably the smallest parish in England, containing only 90 acres.

The next and last halt was at Yate Church, where they were met by the Rector, Rev. A. Pontifex. The Church is a very interesting one, of Norman foundation, but with work of different dates, down to the beautiful 15th century Tower which was never completed. A lively discussion on the architecture was drawn to a conclusion by a general move to the Rectory, where the Rector and his wife had kindly provided tea and other refreshments. After this most acceptable hospitality, the party went to Yate Station, and returned to Bath at 8.23. The weather had been delightful, and this, joined to the kindness experienced at the different points of the journey, made the whole excursion a very pleasant one.

Mr. Talbot has sent the following notes :—

“Of the old church of Little Sodbury nothing but a fragment

remains, which was left when the church was pulled down and rebuilt at some distance from its original site. This fragment comprises the principal doorway, which was in a tower on the south side. It is perpendicular, and is suffering from the weather.

The Manor house retains a late perpendicular hall and porch. At the upper or dais end of the hall an arch remains on the west side, which may have opened originally into an oriel. On the east side a similar arch has been removed; part of the wall having been rebuilt. High up in the wall on this side is a stone mask, which served as a squint into the hall from an adjoining room. This has been moved, but reset in about its original position.

The chamber which Tyndale, the translator of the Bible is said to have occupied, has been taken down. The stonework of its windows, good late perpendicular work, is lying in the hall.

The buildings at the south end of the hall have been rebuilt, or greatly altered. In this part is a staircase of good carved woodwork which may be of the time of James 1st, and an oriel window facing west, in which earlier work has been reset. To the north-west of the hall is a wing of the style that prevailed in the seventeenth, and the early part of the last century.

Old Sodbury Church has been entirely rebuilt, but its original character has been to a great extent preserved. It is a cruciform Church, with the tower at the west end. The Chancel arch has been moved eastward from its original position, and wider Transept arches have been introduced. I omitted to note on the spot, but am pretty sure, that both the arcades of the Nave are similar, being late Norman, and the west windows of the aisles are of the same character. The south aisle has a good Norman doorway. In recesses in the north Transept are two effigies, which may both be of the thirteenth century. One, of stone, is a very rude specimen; the other is, I think, the most remarkable object in the church, being of oak, but much worn. It has been originally a good example.

The Tower, which is too low in proportion to the Church, has

probably been rebuilt in the upper part in the fifteenth or sixteenth century ; some of the older work being reset. The Tower arch has corbels of the thirteenth century.

The field adjoining the west-end of the churchyard, the site of the Manor house, which Leland saw in ruins, is still called the "Court Orchard," and when stone has been wanted it has been the practice to dig for the old foundations there.

At Chipping Sodbury the Church has been well restored by Street. It has a fine perpendicular western Tower. There is an early Chancel arch retaining remains of the original painting, and a good early English arcade between the chancel, and an aisle to the north of it. On the north side of the nave is a pointed doorway, so early as to be almost Norman in character.

In Chipping Sodbury we visited the Town Hall, which, originally a very late Perpendicular building, has been within the last five or six years much altered, and archæologically spoiled. It consisted, before the alteration, of a long hall on the first floor, with a timber roof of the usual character. The floor of the hall was supported by strong beams ; and as these are moulded, the space below must have been, not a mere cellarage, but very likely at one time open to the street and used for holding markets. The building stands with its end to the street, and that end has been turned into modern gothic. The market cross, which is preserved in the garden of the Roman Catholic priest, is a late one, with a plain octagonal shaft, apparently of one stone, and has lost its top.

Yate Church is unrestored. It has a very fine Perpendicular Tower at the west end ; the parapet has been removed and not replaced. The south Transept was originally Norman, as its west window shows. There is an early cross, on a sepulchral slab or coffin lid, rising a little above the surface of the floor, also a brass. These are in the Chapel or aisle south of the Chancel. There is a rather remarkable and abrupt change from late Decorated to late Perpendicular work in the arcade of the nave, with a great contrast in the proportion and shape of the arches,

which is more interesting than pleasing. Also, it is evident that at this point the character of the roof changes, though it is a good deal concealed by plaster. The western part of the Nave is therefore older than the remainder. The Church has a sanctus bell cot.

In the Perpendicular windows a good many pieces of the original glass remain.

July 7th, 1875.—One other bye-Excursion is worthy of record, that to Badminton and Horton.

Badminton and Horton.—Nothing particular occurred to the party of fourteen (12 members and 2 visitors) who left the York house at 9 a.m. in a break and four on the morning of July 7th, save the loss of a gallant Colonel, in Badminton park, and their lucky discovery of the same after a short interval of suspense. After a pleasant drive along-side of the avenue to the lodge, a turn to the left by Ragged Castle out into the Tetbury road brought the party to Horton Rectory. Here the Rev. J. Blackburn conducted the members to the camp, called Horton Castle, an arc-shaped embankment, cutting off a spur of the hill with its convex side turned towards the plateau. A magnificent view was obtained here of the vale of Severn with its rich foliage, and the different historical points of the Cotteswold hills, such as Tyndale's Monument, and the Duke of Somerset's; with Horton Church tower below, Newark house, &c., in the distance. After enjoying the profuse hospitality of the kind Rector and his lady, the members descended the steep slope to the church, a plain and simple edifice of Perpendicular date, with nothing to attract attention, save its extreme simplicity in the internal furniture, and a monument 1737, recording a marriage in the now-celebrated Tichborne family. The south porch deserves a passing notice for its curious capitals. one in the N.W. corner representing a man with the bagpipes, the other some griffin form; a parvise is over the porch. Immediately adjoining the church on the south is the ancient Manor house, formerly belonging to the Paston's, entered by a late

Norman doorway (if it be Norman), about which the Rector gave the following account :—

That it was a house of the 12th century, forming one wing of the present mansion of the time of Henry II, and probably only intended for the residence of a single priest. It was small and of the usual plan, i.e., a lofty hall occupying about two-thirds of the house, the remaining third being divided into two stories; the cellar or parlour below, and the solar (Lord's chamber) above. Under this was the usual passage behind a screen. At each end of this passage is a doorway; one, the chief entrance to the court, the other, the doorway to the church-yard. Both of these doorways are perfect and in good preservation; ornamented with late zigzag mouldings so characteristic of the period. The shafts (pear-shaped) in section, and their capitals (cushion) remain unimpaired. The two Norman windows high up in the wall to the east of the north doorway, are now blocked up, and a small newel staircase with transition doorway leads to the upper chamber.

The floor now continues the whole length of the building, and the upper room was fitted up as a Roman Catholic Chapel by the Paston family, in the 17th century. Behind the altar is a recess, apparently for the purpose of concealing the priest in time of need. Buttresses have been added in the perpendicular period, and a shield (saltire?) with two rings interlaced, introduced over the north doorway. (Notes from paper on *Mediæval Houses of Gloucestershire*, read at a meeting of the *Archæological Institution*, July, 1860, by J. H. Parker, F.S.A.

Supplement to the above :—

The Manor house (of which the Norman house forms one wing) is chiefly of the time of Henry VIII., with a rich doorway of the earliest Renaissance style, over which is a shield of arms with the hat of a Prelate, usually called a Cardinals hat. These are the arms of W. Knight, prothonotary, who probably built the house.

In the garden is a Loggia, a sort of summer-house or open arcade, of Tudor arches, with a wall at the back on which are heads of the Cæsars. It is about 50 ft. long by 12 ft. wide, and called by the villagers "The Music Gallery." On the south face of the garden wall behind the laurels are two stone slabs with inscriptions. One has carved on it a Prelate's Mitre, with 'Wilhelmus Knight Prothonotarius, 1591,' (or, as Parker has it, 1521). The other 'Laus tibi Christe,' with a monogram 'I. T.'

in centre ; with a 'W.' in a square ; followed by an undecypherable date, probably 1597, and a 'B.' in another square at the end. In the garden in front of the Loggia a very fine tulip tree measured, at three feet from the ground, 10 ft. 6 in. in girth.

From recently-discovered documents, the following account of the house was given by Mr. Blackburn :—

Horton Manor house is in the form of the letter E, as was common in the reign of Elizabeth. The northern side is in the Norman style, and was probably built when Agnes, wife of Hubert de Rye, made this manor the corps of a prebendal stall in the Church of Salisbury. It was subsequently annexed to that, see by Richard Poer, Bishop of Sarum, 1222. The remainder of the structure was added by the Paston family, temp. Eley, or James I. The course of descent which the Manor has pursued, seems to point to the reason why the Manor house varies so much in its style of architecture. Having become church property, temp. Henry I., its Lord remained a celibate, and therefore a moderate structure met his wants. In the north limb we find a hall, temp. Henry I. It was apparently open to the roof, as no traces of windows exist on the ground-floor, while a Norman window now stopped up is to be seen in the upper part of the wall. The hall is entered by two doors opposite each other, one north and the other south, both decorated with the zigzag columns and capitals which are perfect. In the south-west angle of the hall are remains of projections for the staircase to music gallery, the door being closed up.

After a pleasant stroll about the shady lawn, and a swing in the hammock beneath the biggest of tulip trees, the members returned up the hill to the rectory, bad farewell to their kind host and guide, and passed through the fields to the Cross Hands, where the brake was in readiness for their return to Bath.

Of the walks which are considered by some so important a feature of the Club, there is not anything of consequence to note. One on the 9th of Nov. to Bradford, by Claverton Down and Brass Knocker hill, perhaps deserves to be recorded, from the fact that the obstruction in the shape of the bolt on Limpley Stoke bridge has been abolished, and that the restoration of the Saxon

Ecclesiola at Bradford is gradually progressing, under the watchful superintendence of the learned vicar. Your Secretary is very desirous that when he is unable to join in the walks (which has happened very frequently this year), some member could kindly supply him with a note, if only to state the object and extent of the walks. He feels sure that there must be some one amongst the yearly increasing additions to the number of the members who have something to remark upon the Natural History, Geology, or Antiquities of the neighbourhood, for the investigation of which the machinery of the Club is alone worthy of being maintained.

The Ancient Stronghold of Worlebury. By REV. H. G. TOMKINS.
(Read 10th February, 1876.)

Your Hon. Secretary has asked me to read a paper to your Society on Worlebury.

In consenting I have told Mr. Winwood that I accept no more ambitious task than the endeavour to give as clear and accurate a notion as I can of that very ancient fastness, and of what was found within it.

One qualification for the work I can claim. During the time of exploration, beginning about 25 years ago, I lived in Weston and was one of those engaged in the work, and I now lay before you original sketches and sections, some of which were engraved in the Proceedings of the Somersetshire Archæological and Natural History Society to illustrate the reports of my lamented friend the Rev. Francis Warre.

As much as possible I will try to avoid theorizing, and you will, I trust, agree with me in thinking that the description I have to give to-night is the more trustworthy inasmuch as it was written and delivered at Weston, and at Devizes, some three-and-twenty years ago when everything described was fresh before our eyes. I took every precaution against error by submitting my paper in detail to my friends Mr. Warre, Mr. E. Martin Atkins, Dr. Pring, and Dr. Thurnam (whom I had the pleasure of entertaining as my guest at Weston) and to my father, whose cautious accuracy was well known to his friends.

I need not say how welcome will be any corrections or additional information which the antiquaries and scholars now present may be so good as to supply this evening.

Worle Hill to the north of the town of Weston-super-Mare, whose slope, once swarming with rabbits, is now covered by the works of builders, town commissioners, and gardeners, is one of those parallel limestone ridges, running nearly east and west, which mark out so strongly the scenery of that part of Somerset.

In length from the base near the village of Worle to Anchor Head it is not far short of three miles. About a mile from the east end it is accessible from the seaward by the very ancient ascent of St. Kew's Steps leading from the village of Kewstoke to the crown of the hill. On the right side, not far from the top, there is an oblong enclosure walled with dry masonry in which Mr. Warre found a strange assemblage of relics ranging from early British to late mediæval dates, and even later.

Walking westward from this ascent we soon enter the wood of fir and larch which covers all the rest of the hill, and which I remember as very young plants forty-two years ago. We pass a cairn or heap of stones on the right of the road, called by the quarrymen and others Pickwinner, which stands, I think, on the highest point of the hill. It is about a quarter of a mile from the east end of the ramparts, but is nearly taken away (A.D. 1876).

Passing on westwards we come to the trench which bounds the outer enclosure, probably intended for the protection of cattle, and which may very likely have been fenced by a stockade within the ditch.

This line of enclosure runs along the south side of the hill as far as the main defences and is carried at both ends across the ridge to the northward as far as the low cliffs above the beach of loose rounded stones skirting the south side of Sand Bay.

Just within this trench on the east side of the enclosure are two hut-circles, and from the south-west angle an ancient way leads downwards along the south slope of the hill in a westward direction to the spot where the limekiln stands (or stood in 1852).

After passing the western or inner trench of the cattle-enclosure (as we may call it) we come to a stony piece of ground cut across from north to south by several trenches close together, intended doubtless to render impossible the advance of cavalry or chariots; the innermost of these takes a bold sweep in a curved line towards the N.W. and S.W., forming the outline of the great defences, and from it rises a rampart of great height and mass,

which was formerly faced both outwardly and inwardly with a battering wall of dry limestone masonry, built without regard to regular courses.

The rampart at Dolebury above the village of Rowberrow in the Mendips was faced with similar masonry.

Within this rampart is a deep trench, and then a second of at least equal or even larger dimensions, which was faced in a similar manner, a piece of which masonry is given in Mr. Bloxam's little work "Principles of Gothic Architecture." To the north this great inner rampart crosses the ridge in a curve and is intersected by a very narrow curved entrance, beyond which it sweeps to the west and gradually sinks to the precipitous edge of the cliff which rendered the whole north side of the camp inaccessible.

To the south and westward the inner rampart sweeps with a huge mass of stones round to an inward point from which a deep trench runs across to the north side, completely fencing off the strongest post of ultimate defence, the citadel, as it were, of the fortification. It then returns with an outward curve to the point where it is intersected by the great south entrance, the inward corners on either side of which are rounded off and thickened like solid towers.

Here the foundation and lower part of the masonry was most plainly disclosed, and from this point the huge ruined heap of a fallen outwork, flanking the entrance, might be seen to the eastward.

Close to the main entrance (which covers itself by running obliquely through) to the west the construction of the wall may be seen at one point.

The inner face of masonry rises to the height of about seven feet, where the thickness of the rampart affords a wall for sentries and defenders, sheltered by a breastwork or parapet. The outer face of the wall shows a very unusual structure. It is formed in stages, each one projecting farther than the one above it; and

these are alternate, and outwardly curved, so that the ground plan presents the outline of scales. (*See section and plan.*)

In this fashion the work is made to support itself on the slope of the hill, and also perhaps to offer standing points for slingers or other defenders. Very many sling-stones are found on these stages.

It is worth while to observe that the plan of the work is generally curvilinear, and there are no salient angles. Where the ground affords a free scope instead of leading the lines, the plan approaches a circle, as at the Eastern stronghold. This resembles the Cornish fastnesses, which are built of dry granite masonry, as I pointed out in a paper read to the Som. Arch. and Nat. Hist. Society, in 1852. Such a plan is not to be wondered at, as the difficulty of constructing an outward angle in masonry of rough stone without mortar would be considerable.

About 60 feet to the west of the great entrance there is, just within the rampart, a quadrangular oblong excavation about 17 feet in length by 13 in breadth, faced within on the north, east and west sides with dry masonry of careful construction. Of the use for which this was intended no very valid conjecture has been formed.

The rampart westward to the point of the hill overlooking Birnbeck is now a continuous ruined heap of shapeless limestone blocks.

Below it on the southern slope of the hill, two parallel trenches run, with interruptions here and there, from nearly opposite the great south entrance to almost the end of the rampart westward.

To the northward was a sort of private entrance for the defenders, covered by flanking works down the steep side of the hill, to the perennial dripping spring at the point called Spring Cove, opposite Birnbeck, which, after so many ages, has at last within a few years past been lost by a landslip. This was the nearest supply of water. The way led through a cave or cleft of the limestone cliff now stopped with stone or earth. The

westward line of defence was originally carried on to the sea boundary about Anchor Head, and there were evidently works along the steep north side of the hill which are now utterly ruined.

I must not omit to mention that on the slopes without and below the ramparts there might be traced clusters of remarkable angular indentations which in the opinion of the late Mr. E. Martin Atkins (to whom we are indebted for the valuable plan published in the Proceedings of the Som. Arch. and Nat. Hist. Society) were probably standing places for slingers, who might greatly annoy an approaching enemy long before they were enabled to make use of any means of defence.

If we now, leaving the lines which protect this formidable fastness, traverse the ground enclosed by them, said to be about $9\frac{1}{2}$ acres in extent, we perceive it to contain a very considerable number of pits of irregular shape and various sizes, but on the average about 5 or 6 feet across and of about the same depth.

These have been wrought out with great toil as the natural splits and rifts of the limestone rock might permit, and we may notice here and there an unsuccessful attempt where the rock has been too solid to allow more than a shallow excavation.

These pits are most thickly clustered towards the east or best protected end of the camp, and especially in a direction north and west from the great south entrance, and towards the north they are disposed in regular parallel rows.

They have all been opened and their contents removed. This was the work of three or four years from 1851, and was done under the inspection of the Rev. Francis Warre, who published his memoir of the results in the Proceedings of the Somerset Arch. and Nat. Hist. Soc.

These excavations were the underground part of those rude hut-dwellings in which the primæval population of this district found shelter when the storm of war drove them to their stronghold; and in these we have with our own eyes looked upon their scanty stores of grain and bones of animals used for food, their

pottery and ornaments of uncouth workmanship; and not on these alone, but on the skeletons of the poor barbarians themselves, gashed through skull and limb with fearful wounds and thrown headlong amidst the ruins of the huts they had so vainly defended.

Those who have stood on the edge of the pit and have seen the bones gradually uncovered of combatants who died in the death-grapple so many ages ago will not easily forget the sight.

The hut-circles were outwardly marked by a ring of stones somewhat raised above the general level, within which there was a bare surface of limestone rubble or small stones somewhat sunk. But Mr. Bloxam who visited and described the encampment in 1845 says, "in one part are the apparent remains of the walls of one of these huts standing to the height of eighteen inches or two feet; these walls are eighteen inches in thickness, constructed of stones, mostly small, piled one above another, enclosing a space not more than four feet six long by four feet wide." He thinks "that there is little reason to doubt but that these cavities are the sites of the huts of the ancient Britons; and that the stones with which they are filled are those of the walls." He also noticed that "some of the stones seem to have undergone the action of fire." "*Archæological Journal*," vol. 1, p. 309.

In the loose mass of rubble the crowbar might be thrust to some depth, and in this manner the pits were first tried to ascertain which were best worth examining.

The loose rubble was then thrown out to the depth of about five feet in most instances and below this the interesting contents of the pits were disclosed.

The first pit opened presented only a little coarse pottery and some wood in a condition resembling that of charcoal. "On the next day," says Mr. Warre, "I was unavoidably absent, but the work was continued under the superintendence of Mr. Atkins, Dr. Tomkins, and Mr. Bailward, and on clearing a similar hole, at about five feet six inches below the surface of the ground was

found a skeleton lying on the right side, with the head to the north-west. This skeleton though in a very decayed state, was nearly perfect with the exception of the lower part of the legs, which had disappeared.

"On cleaning the skull three cuts entirely penetrating the bone, and evidently inflicted by some heavy and very sharp weapon, were discovered; the collar bone and the left arm, a little below the shoulder, also bore marks of severe wounds, apparently from the same cutting weapon; there was nothing else of interest in this hole."

On Monday, October 21st, 1851, another pit was opened rather near the south entrance. In this, the sides, to the depth of about three feet and a half, were of the natural rock, but from this point downwards to the depth of two feet was a nearly circular excavation lined round with dry stone masonry.

Its dimensions were four feet six inches in the wider diameter and four feet in the narrower.

Within this straitened pit were found three skeletons forced in and lying doubled up on their sides in various directions, the head of one being towards the south, of another towards the west-south-west, and of the third towards the north.

One of these skeletons was that of an unusually tall man whose skull was cleft to the brain by a deadly cut from some very sharp weapon, and whose left thigh-bone was also cut in an upward direction as if by a stroke from an enemy below.

Beneath the bodies was a quantity of dark mould; then some charred grain (wheat and barley) lying under some thin plates of *lias*. There were also some horses' teeth and a number of shore-pebbles, doubtless intended for the sling. Mixed with the grain were "some small bones, apparently those of birds," and the pit also contained some fragments of ochre, part of which was burned, and some charred wood.

The bottom of the pit was merely the solid rock. The account just given of the opening of these two pits will give a good

impression of the usual course of the explorations. "The deposits in all are nearly the same" (says Mr. Warre) "first, earth washed from the surface; then, rubble and pieces of rock, to the depth of about five feet; then black earth with fragments of wood; then broken stones, and lastly, the solid rock."

My time forbids my proceeding to describe the opening and contents of the various pits. I will therefore give a more digested and systematic account of the relics which have been discovered.

But first I will give exact particulars of the successive deposits in the very remarkable, and indeed unique, pit lined in its lower part with the masonry as just described, beginning from the bottom.

Bottom live rock.

1. Quantity of wheat with a little barley.
2. Thin plates of lias.
3. Layer of broken stones.
4. Quantity of dark mould.
5. Skeleton, head to north.
6. Six inches of earth.
7. Remains of two skeletons across each other on their sides with legs drawn up.
8. Four inches of earth.
9. Top of the masonry, 27 inches in height from the rock bottom.
10. Three feet six inches of rubble to the surface of the ground.

As to human remains discovered in the pits.

These have been such as to indicate by entire skeletons, or by portions of bones, or limbs more or less complete, the presence of a number of individuals amounting, as Dr. Pring assured me, to about eighteen, of these as many as half were manifestly killed in fight, and there was not one case, I believe, which gave any reason to infer an ordinary peaceful interment.

In one case the head was cut completely off, the highest cervical vertebra (*atlas vertebra*) being severed by a clean cut. In some the skulls were cleft. Among the bones of one who had

fallen forward to the bottom of a pit with his arm raised as if to defend his head, a javelin head of iron rudely wrought was found. In one pit were the skeletons of two men in the attitude apparently of deadly conflict, the skull of the lower being broken against a sharp point of rock.

It appeared clear in some cases that pieces of rock had been violently thrown in on the bodies, so violently indeed that the skull of the tall warrior before mentioned was much fractured and displaced, and the left collar bone dislocated and forced up into the hollow of the lower jaw.

The depth at which the skeletons were found is of course a most important point. Now one was found about 5ft. 6in. below the surface. In the pit lined with masonry the highest skeleton was about 3ft. 6in. deep, another beneath it and six inches lower the tall warrior, the whole depth of the pit being 5 feet 9 inches.

In another pit were human bones rather more than 5 feet deep, "the skeleton lying on its face," and an iron spike about 4 inches long about 8 or 9 inches below the jaw. "Under this" the usual deposit of black mould and pieces of stick like wattle-work, and under this the wheat and barley kept separate by pieces of thin board, and part of a sedge mat.

The depth at which human remains were found is of course one of the most important data for any guess as to the time when the fight took place, in which it is clear that these poor barbarians met their death.

The pits were simply the underground portions of dwelling-places which consisted of low circular dry walls surmounted by roofs of branches thatched with reeds or some such covering. For it does not seem that these huts were built of contracting layers of stone.

There is every probability that the quantity of charcoal mixed with pieces of branches and twigs which was found in most of these pits was in fact the material of the roofs which were burnt and fell in. That a sufficient quantity of wood was burnt to pro-

duce an intense heat is clear from the fact that the stone sides of the pits were in many cases calcined on the surface, and that many pieces of stone found among the charcoal were burnt to lime. That the burning material fell in is clear from the fact that the stores of corn were burnt from above, the highest portion being most completely reduced to charcoal.

The remains of animals and vegetables used for food indicate a race in a pretty advanced state of barbaric civilisation. Of animals there were bones of oxen of a small kind, of which a great abundance was found. Part of a skull and horn was submitted to Professor Owen, who pronounced the animal to be the *bos longifrons*, which, says Dr. Latham, "may have originated some native breeds which the inhabitants of even the earliest period, the period of stone and bone implements, may have domesticated. The opinion of Professor Owen is in favour of this view, and certainly, though it cannot be enforced by mere authority, it is recommended by its simplicity."* Bones of pigs were also found, and in one pit a pig's skull with the back in contact with the rock, showing, as Mr. Warre points out, that it was severed by human agency. Bones of deer and of horses, and one hoof of a small horse, were discovered in the pits. I believe some goats' bones must be added to the list. The bones of various-kinds of water-fowl and other birds were remarkably plentiful.

Among the contents of several pits I saw the shells of limpets here and there. Of vegetable food wheat and barley have been found in considerable quantities, and also a kind of pulse or small pea.

In one case the wheat and barley were carefully stored away at the bottom of the pit on some pieces of board, and the different kinds even kept separate by thin slips of wood.

The great probability of fish having formed a considerable portion of the subsistence of these people must not be overlooked.

* "Ethnology of the British Islands," p. 25.

Of these no remains would be found.

Of weapons the most remarkable seems to have been the sling, for the common use of which we have presumptive evidence in the very great numbers of selected round pebbles of a suitable size which were found carefully stored away in the pits. These would be obtained from the other end of the bay near Sand Point. That slings were used by the ancient Britons is known. "The younger British slingers (*exculcatores*) are found among the Palatine auxiliaries," says Mr. Wright.* Among the loose stones below the ramparts these pebbles are found beneath the surface, and Mr. Martin Atkins told me that he came upon them in exploring the angular indentations or platforms on Sand Point.

Some flint flakes about the size for arrow heads were found in the pits.

The iron weapons in the pits were two or three spikes of iron about five inches long, probably javelin heads, of which one was found about 5 ft. 9 in. deep in a pit underneath human bones, as before mentioned, and two quite well-made leaf-shaped spear heads with sockets. These were about four inches and five inches long.

Also a "piece of iron about eight inches in length, which, though quite rusted through, appeared to be the head of a large spear." This last, be it remarked, was found "just above the floor."†

There was also a spiked conical ferule of iron 7 inches long found in one of the pits, with a rivet-hole in one side, and the charred remainder of the shaft still within the socket.

The only probable relic of a defensive kind consists of the remains of two concentric rings of iron found one within the other, the outer one being a rim with rivets remaining in it, which were perhaps parts of a shield.

* "The Celt, the Roman, and the Saxon," p. 104.

† Proc. Som. A. and N. H. S., 1851., p. 82.

Some manufactured objects of use or ornament must be noticed. Fragments of a horse's bit of iron with its ring on one side. A piece of platted sedge, probably part of a mat or basket, a piece of wood bored with two holes, the purpose of which has not been guessed, part of a bone comb, part of a circular armlet, apparently of wood. One beautiful blue glass bead found three feet deep in a pit on 7th September, 1852. A "spindle-whorl" of earthen ware, another made of a flat round pebble pierced through the middle, a similar sort of object composed of a marrow-bone, and a button, made of the upper end of the humerus of a human being, I believe, pierced through the middle.

A very remarkable find consists of two rings of iron about an inch in thickness and about the same in diameter "quite down on the floor of a pit under a projecting ridge of rock." Near the bottom of the same pit was part of a very small ring apparently of bronze.

We also found in a pit a very small torque-shaped ornament of bronze, only an inch and a quarter in its longer diameter, with a small rivet and a corresponding hole in the other end, and also an object fashioned from a deer's antler, apparently the mouth-piece of a horn, ornamented with rings round it, which were joined by straight lines with rows of circles between.

In 1853 was found on the top of the hill above Kewstoke a beautiful little penannular ornament of bronze about $\frac{3}{4}$ in. in diameter, having its terminal knobs shaped by cutting off the angles diamond-wise, exactly like the anklets and bracelets still in use in Syria.

The pottery found in the pits was very interesting, of very rude and coarse manufacture and in large quantities.

Some vessels were very carefully restored by my father Dr. Tomkins and by Dr. Pring. They were of simple form, especially one of about 14 in. in height, and the same diameter at the rim, which after being most carefully restored fell to pieces through its extremely loose and friable composition.

This was perhaps not made on the wheel, but the smaller vessels about 6in. high although rude and ill-baked seem mostly to have been so formed. Dr. Thurnam told me he believed the form of the smaller vessels to be unique. Probably they may have been employed to hold water, and most likely for cooking, as the mark of fire and smoke may clearly be seen, especially on the large one. Certainly none were here employed as cinerary urns or for any sepulchral purpose.

Three of the smaller vessels are engraved in the Somerset Arch. and Nat. Hist. Society's Proceedings for 1852. One is rudely ornamented outside on the upper part with curved and zig-zag lines. Several other relics are also there engraved from my drawings. The original sketches I now submit to your inspection.

In 1852 broken Roman pottery was found on the surface under the grass "sufficient to fill 13 or 14 large baskets," and with it several large iron nails, a large number of late Roman coins, and a good many curious glass beads, red, greenish, black, grey, and white in colour, mostly of the tubular kind called bugles.

Of course all these, the only Roman remains except perhaps the iron weapons, must be kept quite clear in our minds from the contents of the pits.

And now I will venture to say a few words on the interesting question of successive dates suggested by the discoveries at Worlebury.

The great stronghold appears in its complicated and ingenious details of structure unique among all that have yet been described. In the "*Archæological Journal*" for 1872 p. 314 is a very interesting description of a primæval fortress called Ar Castel Coz on the coast of Brittany, which has been compared with Worlebury. It seems to me, however, to be probably of later date, although presenting in important points much similarity.

That so much ingenuity and skill should be shown at Worlebury by builders who used no cutting tool and no mortar is no argument of late, but rather perhaps of early, date.

The pits may be easily coeval with the ramparts and works in general. But of course it is most improbable that the stores and relics found at the bottom of those pits are of anything like such antiquity.

Nevertheless they tell of a very rude condition of life. Iron seems to hold the place of a precious metal, and the pottery is very rude. But we find the traces of fight and death in battle reaching very low down in our pits, and, next above the stores of grain, the layer of burnt wood and wattle which reduced to charcoal the grain itself, or the upper part of the layers of grain, as Mr. Warre has recorded.

The relics found in the lower part of the pits indicate a barbarism untouched by the hand of Rome.

Such a state of things would quite agree with the supposition that the pits were last used for habitation when Ostorius Scapula (A.D. 51) conquered this part of England, and the account given by Tacitus of the storming of the last retreat of Caractacus by the same general would probably suit in the main the assault of Worlebury.

"That chief," (Caractacus), leaving the more open country of the Silures to be overrun by the enemy, had withdrawn into the wilder country of the Ordovices (in North Wales) where he chose a strong position difficult of access even without the assistance of artificial defences. On the more accessible parts of the high hills he threw up a kind of rampart of stone while below and in front was a river difficult to ford. Here the British chief awaited the attack of his enemies or perhaps amused himself with the belief that his stronghold was too formidable to be attempted, for he had with him his family consisting of a wife and daughter.

The Britons thus posted, and excited by the example and exhortations of their leader, presented a formidable appearance to the Roman legionaries, protected as they were by the river which ran before them, and the steep declivity [acclivity ?] which rose in their way. But the soldiers, to use the words of Tacitus,

"were clamorous for the attack, crying out that their valour would overcome all opposition, and the inferior officers breathing the same sentiments gave additional courage to the troops. Ostorius, after reconnoitring the ground to see which parts were impenetrable, and which accessible, led on the eager soldiers and with much difficulty crossed the river. When they came to the rampart, while the enemy threw their javelins at a distance our soldiers suffered most, and many were slain.

"But when ours closed their ranks and placed their shields over them, they soon tore down the rough irregular piles of stones and attacking the enemy on level ground obliged them to fly to the hills. Thither also both the light and heavy armed soldiers followed, the former attacking them with their spears, the latter in a dense body, till the Britons, who had neither armour nor helmets to protect their persons, were thrown into disorder, and if they made any resistance to the auxiliaries they were cut in pieces by the swords and spears of the legionaries, and when they turned upon the latter, the auxiliaries destroyed them with their sabres and javelins."* Now our lamented friend, Mr. Warre, referred the last occupation of the pits as dwellings to this time, but his theory was that the onslaught whose evidence remains in the gashed bones of the warriors was made by Ceawlin, the Saxon, in the year 577, that is, that five centuries and a quarter had passed between the time when the stores of grain and other possessions of the pre-Roman Britons had been deposited in the pits and the day that added to the contents of the same pits the skeletons and the iron weapons by which they were slain. I never could see good reason for this opinion at the time, nor can I now.

If it were so, is it likely that in a pit about six feet deep a skeleton with three cuts through the skull should be found within about six inches of the bottom, and that in the one pit lined with

* "The Celt, the Roman and the Saxon, p. 24.

masonry in its lower two feet of depth the upper of the two crossed skeletons should be four inches below the top of the masonry, then the second, and six inches below this the tall warrior gashed through skull and thigh in the attack 525 years later, and then the black mould of the decayed roof and the stores of the time of Ostorius Scapula?

Again, in a pit which I myself saw opened were two skeletons, as if in the attitude of a struggle, the lower of which had its skull broken in against a sharp angle of rock at the bottom of the pit.

And one of the iron weapons, apparently a spear head, eight inches long, lay, as Mr. Warre has recorded, just above the very floor of a pit.

If we suppose the huts to have been burned and to have fallen in, and in some cases the dwarf wall of dry stones, such as that found by Mr. Bloxam, to have been pushed in on the burnt material of the hut (which might well have been done, even to extinguish the fire, or in a struggle), in other cases merely earth or nothing at all pushed in; then a successful assault of auxiliaries variously armed, and the heavy legionaries: I think the necessary conditions of all that we found in the pits had been fulfilled. But it would be presumptuous to insist on this in a positive way. I will state Mr. Warre's conclusions in his own words.* "That the place was destroyed by Ostorius in the reign of the Emperor Claudius, and deserted during the period of the Roman occupation; that the black earth and burnt wood which are usually found a few inches above the solid rock in most of the hut circles are leavings of the inhabitants of the place at the time of Ostorius' attack; and that the pottery is almost all of British manufacture, some probably Belgic, the work of the last two or three centuries before the Roman invasion. That at the time of the West Saxon irruption under Ceawlin, in the year 577, some of the Romanized Britons took refuge within these ramparts, and that the skeletons,

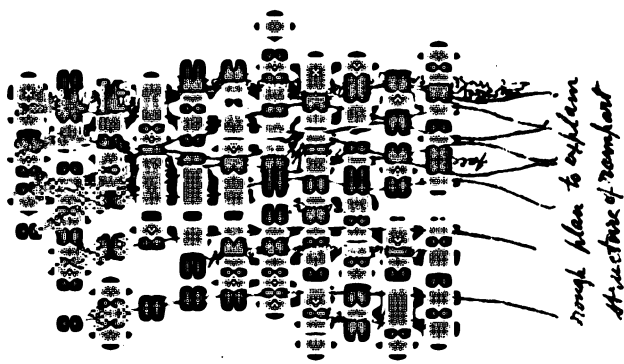
* Proc. Som. A. and N. H. S., 1853, p. 124.

WORLEBURY.

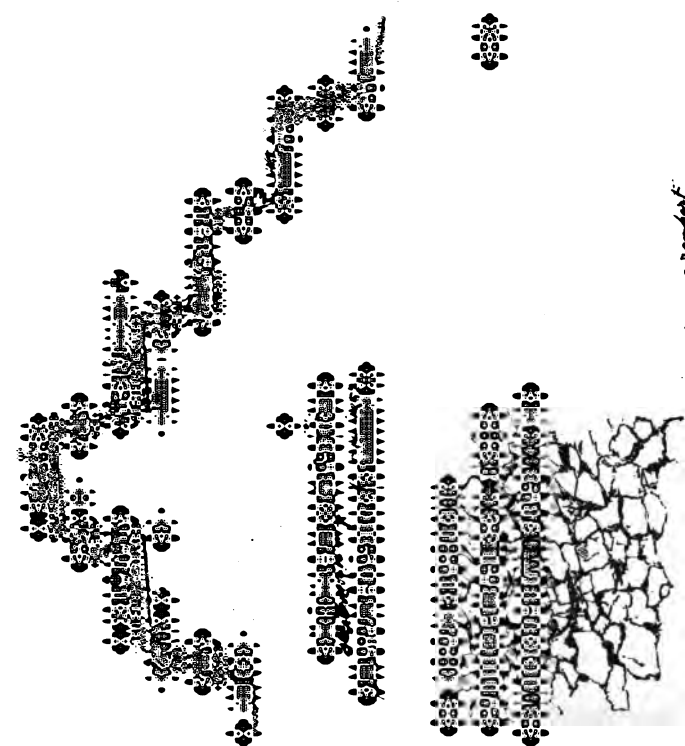
DESCRIPTION OF PLATES.

- I. Section of rampart on S. side of the Camp to the W. of the entrance from actual measurement by Rev. Henry G. Tomkins in 1852.
Sketch-plan to show construction in stages.
Specimen of dry masonry.
- II. Accurate sketch of the one pit lined with dry masonry, by Rev. William Smith Tomkins. N.B. In a lithograph given in the Proceedings of Somerset Arch. and Nat. Hist. Soc. in 1852 the masonry is incorrectly drawn as if in courses.
- III. Fig. 1. Earthenware vessel found in a pit Sept., 1852.
„ 2. Ditto found with a spear-head of iron in a pit Sept. 3, 1852.
„ 3. 'Spindle-whorl' or large bead of terra-cotta found in a pit.
„ 4. Small penannular ornament found on the top of Worle Hill above Kewstoke in Aug., 1853. The material appears to be a very white-looking bronze.
„ 4a. Terminal knob of anklets now in use in Syria, from Dr. Thomson's work "The Land and the Book" p. 129.
„ 4b. Knob of silver anklets in museum of Palestine Exploration Fund.
„ 5. Bead of beautiful blue glass found 3 feet deep in a pit. Sept. 7, 1852.
„ 6. Broken end of a horn (deer's antler?) found in a pit, May 22, 1852
„ 7. Iron ferule with rivet-hole, still containing charred end of the staff; actual length 7½ in. Similar objects are figured among relics found at Wroxeter (Uriconium).
„ 8. A small torque of bronze, actual size, found in a pit.
„ 9. Flint-flake (arrow-head?) found in a pit in 1852.
- All these drawings are printed by the Anastatic process by Mr. Cowell of Ipswich.

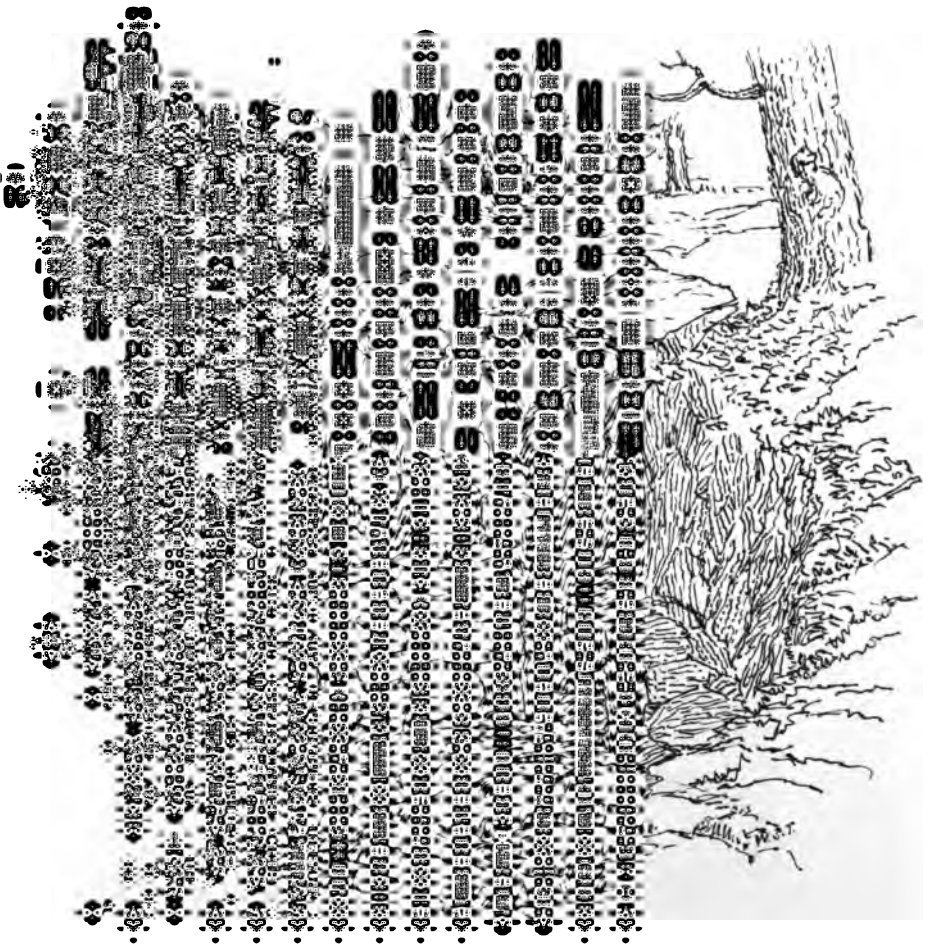
N.B.—The Plan of Camp has been reproduced by the kind permission of the Council of the British Archaeological Association.



rough plan to explain
structure of roof

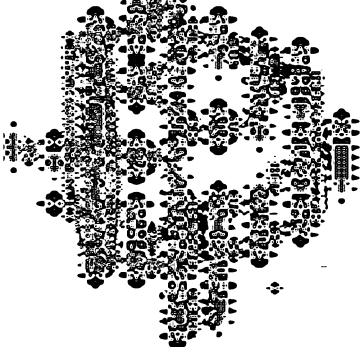
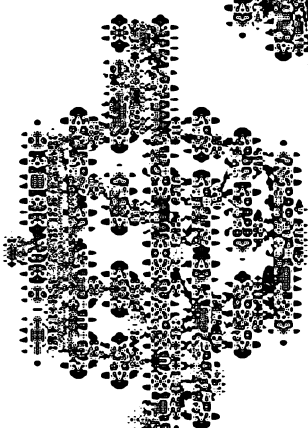
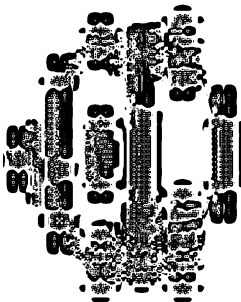
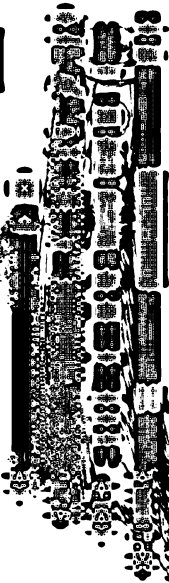
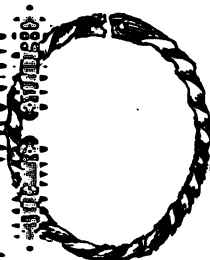


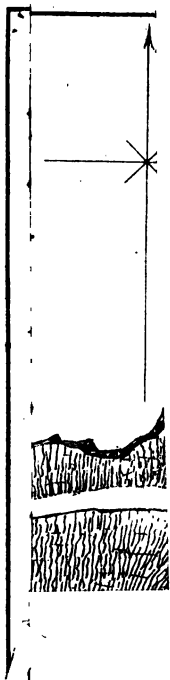
dry limestone masonry, inner face of inner rampart,
7 feet in height exposed
East end of camp, 1852.



was opened in 1857
by W. S. Trunkers.

Rev. H. H. Thompson, D.D.





and the iron weapons found with them, are to be referred to the desperate hand-to-hand contest which took place after the Saxons had stormed the defenders of the fortress."

However this may be, there is a breach in the rampart on the south side of the camp more than half way between the great south entrance of the westward end, and Mr. Warre pointed out an inner supplementary trench, called by military engineers a retrenchment, to make good the defence after a first successful assault.

It seems to me probable from the point of attack that the assailants may have come by water.

Although I have now finished all that concerns the stronghold of Worlebury itself I will add a few words on the peaceful settlement which in very early times, as now, extended from the western part of the south low slope in the direction of Ashcombe and Worle.

"Bones of gigantic size" are said to have been found in blowing up the rock at Knightstone before the houses were built, perhaps the bones of some British chieftain. Mr. Rutter tells us that he had himself examined these bones, which were in the possession of a gentleman at Bristol, and could vouch for their unusual dimensions.

Westwards from the parish church skeletons have been found, especially (as I was informed) in digging the foundations at Coombe Lodge. And beneath many houses in Park Place and the Royal Crescent remains of former occupants have come to light.

From notes of information given to me by Mr. Benjamin Brice, a respectable builder of Weston, I transcribe a few particulars.

In digging for No. 12, Park Place five or six skeletons, including that of an infant, were found about three feet deep in the sand. They were not at all broken or cut, and were laid straight, in what direction Mr. Brice could not remember.

Where No. 16, Park Place [now No. 1 in the new system] stands about five or six skeletons were found side by side in

shallow parallel trenches pointing north and south with their heads towards the north. These were full-sized men with well-preserved skulls. They lay in limestone rubble only nine inches beneath the ground.

On the sites of Osborne House and Picton House (Nos. 11 and 13, Park Place) several skeletons were found in sand, laid "one here and another there."

Between Nos. 5 and 6 in the Royal Crescent in sinking a well Mr. Brice found a good upper stone of a quern or handmill which he gave to me. It was found six or seven feet deep in the sand.

Where Nos. 2 and 3, Royal Crescent now stand two or three little enclosures were found pitched with stones and surrounded by walls of dry masonry about three feet high and eighteen inches thick, the walls of rough limestone without cement of any kind. The pitching was very much worn down. The enclosures were about 12 feet by 6 feet oblong. The courts were separate and irregularly placed, not adjoining one another. There were also pitched spaces unenclosed by walls. Here many fragments of coarse earthenware were found.

These enclosures must have been very similar to the oblong walled excavation in the Camp and the curious building on St. Kew's Steps: and they recall the description of Ar Castel Coz before mentioned.

In the field called the Lynch, near Ashcombe, is an enclosure probably of British construction in which ancient remains have been found. It may have been a cemetery.

It only remains to point out the sources of information with regard to this very ancient fastness.

In "Rutter's Somerset" is a notice and a rough woodcut plan. The notices by Mr. Bloxam have been overlooked by others, although I mentioned them in a lecture in 1852. I have already given the references. The Rev. W. Jackson delivered a lecture at Weston in 1860 and another in 1871, and has lately edited a description published by Robbins of Weston; and a paper was

read by the Rev. H. M. Searth last year to the British Archaeological Association and is published in its Proceedings.

The principal record of the investigation may be found in the papers of the Rev. F. Warre in the Proceedings of the Somerset Arch. and Nat. Hist. Soc. for the years 1851, 1852 and 1853.

It is much to be desired that a complete, trustworthy, and lasting memorial should be published. It seems that Mr. Jackson entertains an intention of putting forth such a work.

Results of Recent Archaeological Researches. An Address delivered to the Members of the Bath Field Club. By the Rev. Preb. SCARTH, M.A.

(Read Feb. 18th, 1876.)

It has fallen to me again, however unworthy, to take the place of our much-valued President, and to offer at our annual meeting a concise statement of what has been achieved in my own department since I last had the pleasure of addressing you. At that time I endeavoured to place before you what had been accomplished in the wide field of archæological research within a limited period, and sought to bring into a brief summary the results that have been achieved of late years in Egypt, in Assyria, in Persia and Phœnicia, in Greece and Asia Minor, and in Italy, and then gather under one head the most recent discoveries in our own country. That address has appeared in the last published number of our "Proceedings." The course I purpose now to pursue is to take up the subject where I left it off two years ago, and to endeavour to show what has since been accomplished, so that all our members may have a clear view of the progress made in archæological investigations.

I could only, in a brief note to my last discourse allude to the researches which were being conducted by Mr. George Smith on

the site of ancient Nineveh, who during the years 1873 and 1874 carried out what had been begun by Mons. Botta and Mr. Layard, and who has now given the valuable result of his labours in a volume published only last year (1875). It would be too long even briefly to enumerate all he has achieved. Having first diligently studied the remains and inscriptions brought to light by the two gentlemen I have mentioned, and mastered the contents of the tablets and fragments of cuneiform inscriptions deposited in the British Museum and in the Louvre; by his further researches he has been enabled not only to add to their number, but to recover many missing portions of tablets which were before imperfect. Happily these acquisitions have enabled Oriental scholars to re-construct Assyrian history. The Chronicles of the Assyrian Kings are now almost as satisfactorily settled as the Succession of the Roman Emperors or Kings of England. The events of each reign have been found recorded, and have been copied, and where the Greek historians fail, or the sacred records of Holy Writ do not touch upon Assyrian History, there these Tablets bring forward abundant information. The Records having been kept upon clay cylinders, or cut upon tablets of alabaster, or carved upon mythological or other figures, have withstood all change of atmosphere, and the palaces having been plundered and deserted, have been left with their records of the doings of past ages, to find employment for modern investigation, and to reward the labours of European scholars. Assyria has now yielded even a richer store than Egypt of those records, which tend to confirm and to illustrate the truths of the Hebrew Scriptures.* It is much to be hoped that the results of these

* The latest paper read at the Society of Biblical Archæology, 1st February, 1876, was one on the "Revolt of Heaven," translated from a cuneiform tablet. The text of this tablet is one of those published by Professor Delitzsch, and presents a remarkable analogy to the "War of the Dragon" described in the Book of Revelation, and to certain passages of the Book of Job, and the Apocryphal Book of Enoch. A paper has also been read by Mr. Fox Talbot,

discoveries now made known, may be the means of promoting still further investigation, and preserve from destruction much which is being sacrificed through Turkish apathy and native ignorance. Mr. Smith remarks that "The Turkish officials, while always ready to oppose researches and prevent the discovery or removal of monuments, never hinder the natives from destroying antiquities."*

It may not be known to all our members, that the son of a member of this Club has published an Assyrian grammar, and

on the Creation Tablets and the institution of the Sabbath. The Text of this Tablet was presented to the Society by Mr. G. Smith before his departure for Mesopotamia. Another contains the Chaldean account of the Tower of Babel which is a Translation of a Fragment discovered by Mr. G. Smith at Nineveh.

* In a communication to the *Athenæum*, 12th Feb., 1876, Mr. George Smith says:—"I have discovered a Babylonian Text, giving a remarkable account of the Temple of Belus at Babylon," and then he gives the particulars of its structure. "It was constructed in stages, and the whole height 300 feet, equal to the breadth of the base, the four sides of which faced the four cardinal points. The only ruin now existing at or near Babylon which can be supposed to represent the Temple of Belus, is the mound and enclosure of Babil, the ruins corresponding fairly with the account of these structures in the Greek authors and in the inscription. The Mound of Babil, which is identified by the best authorities with the Temple of Belus, consists now of the lower stage of the Tower and the building round it. We can only conjecture that the magnificent superstructure was removed by Alexander the Great in his operations for clearing the site and rebuilding the Temple, a work which he did not live to accomplish." This Mr. Smith regards as the *Tower of Babel* mentioned in Genesis, as the dimensions of this Tower as given in the newly decyphered Tablet, are twice that of the Borsippa Tower, or that of Birs Nimrod, which he had supposed at first to be the Tower mentioned in Genesis. "This magnificent Temple rising more than 300 feet above the plain (twice the height of Birs Nimrod) and towering far above every other building in the country, overlooked the capital Babylon, and commanded a view of the cities and temples, river and canal, cultivated fields and gardens unequalled in the world."

has contributed much to the elucidation of the inscriptions I have mentioned.* He lately favoured the Bath Literary Club with a paper on Babylonian Myths, and has since been elected a member of that Club.

Such achievements do honour not only to the individual but to the city to which he belongs.

Professor Rawlinson observest "Assyria, Media, Semitic Babylonia, Persia, as they derived from Chaldæa the characters of their writing, so were they indebted to the same country for their general notions, for their architecture, their decorative art and still more their science and literature.

Chaldæa stands forth as the great parent and original inventress of Asiatic civilisation.

The alphabet as well as the language of these various races differ; but as all assume the wedge as the ultimate element out of which their letters are formed, it seems almost certain that they learnt the art of writing from one another. If so Chaldæa has on every ground the best claim to be regarded as the teacher of the others.

As the national result of these archæological investigations we have now ancient history written from existing monuments. We are not compelled to rest as hitherto upon the testimony of the Greek and Roman writers, but have their testimony confirmed or corrected, and its deficiencies supplied by the reading of their lettered stones, or clay tablets and cylinders. Thus the same gentleman who has for two years been investigating at Nineveh, and is now gone out a third time, has written a small volume on the "History of Assyria from the Earliest Times to the Fall of Nineveh." This has been published by the Christian Knowledge

* Mr. Sayce who conducts an Assyrian class in London. The reading of the cuneiform inscriptions has therefore become an acknowledged part of education.

† See "Great Monarchies," vol. i., p. 216.

Society. We have here a list of Assyrian Kings from the year B.C. 1850 to B.C. 620, a period of 1230 years.*

While Mr. Smith has done so much for Assyria Dr. Birch has done no less for Egypt. He has also written the history of that wonderful land from the stony records which have been preserved. The study of the hieroglyphics and of the wall paintings has enabled him not only to bring Egyptian history into a perfectly arranged system from the earliest dawn of its existence to its decay and fall as a nation, but also to paint the domestic manners and customs of the people as they once lived. "In private life," he says, "the Egyptian Lord led a charmed life, his estate was cultivated by slaves, his household full of domestics; the barber, the waiting-maid, the nurse, appear as necessary adjuncts to his household as the steward who presided over the distribution, and the clerk who checked the expenses of his daily life. Each Priest or Noble had in his establishment all the trades necessary for his ease and comfort; the glass-blower, the gold-worker, the potter, the tailor, and the baker and the butler. His leisure or ennui was charmed by the acrobat and the dancer, the harpist and the singer; games of chance and skill were played either by him or in his presence. The chief occupation of the period, or at all events that most often represented in the tombs, was the inspection of the farm. The Noble of the Fourth Dynasty was a hereditary landed proprietor."†

But archaeological research has attained to more than opening out the pictures of private life in ancient Egypt, it has recovered the Record of Ancient Egyptian Kings. Mr. Duemichen found at Abydos on a wall of a temple there, a list of seventy-six Royal names, commencing with Menes, the first monarch of Egypt, and

* The lamented early death of Mr. George Smith while prosecuting his researches abroad, has been a heavy loss not to this country alone, but to the whole scientific world. The above was written before the sad event took place.

† See "Egypt from Earliest Times," by S. Birch, LL.D., p. 44.

ending with Sethos I., of the nineteenth dynasty. For the first six dynasties the list is consecutive. The rest of the series coincides with that of the Table in the British Museum.

Mons. Mariette had previously discovered at Sakkarah another series of Royal names inscribed on the walls of a private Tomb. (*See Archæol. Journal, Vol. XXIV., p. 5.*) But what is perhaps of deeper interest to us is the discovery of the statue of Menephtah, the supposed Pharaoh of the Exodus.

"It is generally admitted that the Exodus took place in his reign and that he was the Pharaoh addressed by Moses and Aaron, visited by God with plagues on account of the hardness of his heart, and finally drowned in the Red Sea, in pursuing the Hebrews after their departure from the Land of Bondage."

Lately a new theory has been started about the place from which the Hebrews commenced their journey at the Exodus. It is supposed to have been from Paramessu or Tanis, and that the Hebrews took the northern route, between the waters of the Lake Serbonis and the Mediterranean, where the sea waters had subsequently engulfed an army of Artaxerxes. This theory of the Exodus was put forth at the International Congress of Orientalists (17 Sept., 1874), and may be read in the "Academy." (26 Sep. same year p. 352.) "The difficulties, however (observes Dr. Birch), of reconciling the Scriptural account as to the time passed in the transit, as well as that of allowing the philological coincidence of some of the Egyptian names, have caused this brilliant discovery of the supposed direction of the Exodus not to be universally admitted by those who have studied the antiquities of Egypt or Biblical geography.*

* In pure Egyptian Archæology among the most recent matters of interest is the translation of the great Ebers Papyrus, a Treatise on Egyptian Medicine; also a large edition of the "Ritual of the Dead," (the management of which was at the Congress of Orientalists deputed to Dr. Birch, M. Chabas, Lepsius and Naville), has now been projected.

In my former address I touched upon the discovery of the bilingual tablet, nearly eight feet high, at San, the ancient Tanis, by Professor Lepsius. It resembles the Rosetta stone, and is of the date of the 9th year of Ptolomy Euergetes I., or B.C. 238, *i.e.* about fifty years older than the Rosetta stone. "In one point it is of the highest interest to the chronology of Egypt. It mentions that the priests aware of the disturbance of the due celebration of the festivals by which those which ought to have been held in the summer fell in the winter, decreed the institution of a *leap year* by the addition of a day to be added every fourth year to the five "Epagomenæ" or intercalary days. This day was to be dedicated to the festival of the Monarch, and the year thus created anticipated the so-called Julian year of the reformed calendar of Sosigenes, B.C. 45, by nearly two centuries." (*See Archæol. Journal, Vol. XXIV., p. 4.*) "When this tablet was discovered Egyptology or the Science of Egyptian interpretation was said to be put upon its trial, as the Greek inscription on it would either confirm or contradict the results of recent researches, and Egyptology comes out triumphant from that trial. Not only have the proper names of Cleopatra and Berenice been found, but the body of the text, words, grammatical forms and inflections agree with what had been predetermined by Egyptologists, and only some trivial modifications of the sense of a few words will result from the discovery of this tablet." The same success which has crowned the labours of Egyptologists and which the discovery of their bilingual tablets confirms beyond a doubt, has also accompanied the labours bestowed upon cuneiform writing. Sir H. Rawlinson first succeeded in interpreting correctly the monument of Darius I. at Behistoun.

The power of interpretation depends very much upon the supply of monuments and texts accessible to the interpreter. Happily these are now very abundant in the cuneiform characters. In addition to those brought home by Mr. Layard and Mons. Botta, Mr. Smith obtained as many as 3,000 inscriptions and

fragments of inscriptions in the space of four months. Many of them formed part of the texts, the other portions of which were already in the British Museum, and the recently acquired fragments enable scholars either to complete or to enlarge these inscriptions.

Previous to Mr. Smith's two visits to Assyria and Babylonia, the list of Babylonian Kings was very limited. In "Rawlinson's Ancient Monarchies," second edition, published in 1871, only 28 are given, reaching backward from B.C. 747 (after that period they are well known). A great advance has now been made, though the catalogue is not complete, but there are upwards of 130 that are now upon record.

The light already thrown by the Assyrian inscriptions on Biblical History forms one of the most interesting features in cuneiform enquiry, and there can be no question (as Mr. Smith observes) that further researches will settle many questions still in doubt, and give us new information in this field, of an important character. "The value of the Assyrian and Babylonian mythology rests not only on its curiosity as the religious system of a great people, but in the fact that here we must look, if anywhere, for the origin and explanation of many of the obscure points of mythology of Greece and Rome. It is evident that in every way the classical nations of antiquity borrowed far more from the valley of the Euphrates than that of the Nile, and Chaldæa rather than Egypt is the home even of the civilization of Europe."*

After all the inscriptions we have obtained through Mr. Smith's exertions, he calculates that there remain at least

* Mons. Lenormant has lately shown that the Figures which occur in Gaëtic Gems, and which were supposed by De Rossi and Mr. King to be Chinese, are really of Assyrian origin, and represent Demons of Plagues and Diseases, which are engraved upon amulets for the purpose of preservation from harm. See "Le Majic."

20,000 fragments on the site of the library of the Palace of Sennacherib at Kouyunjik, buried in the unexcavated portion, which would reward further labours, and it would require an outlay of £5,000 and three years' work to recover this treasure.*

Passing now from Assyria and Egypt, the publication of Dr. Schliemann's book giving the account of his excavations on the plain of Troy, and the illustrations which it contains have given scholars an opportunity of judging for themselves how far he has succeeded in identifying the remains on Mount Hissarlick with the site of Priam's Pergamus. The discoveries which he is reported to have made led Mr. Newton to examine very carefully the remains that had been disinterred, and in April, 1874, he laid before the Society of Antiquaries the result of his investigations. These are now published in the Society's Proceedings, p. 215. He states that the pottery found at Hissarlick resembles that found "on three sites, Marino, Santorin and Cyprus, each of which sites has yielded remains presumed to be of very high antiquity." "It resembles in shape the ancient pottery of Italy, Santorin, Cyprus and Germany," and that it is not only non-Hellenic but also pre-Hellenic, and is earlier than the Græco-Phœnician." He supposes that the whorls of spindles of which so many drawings are given with the Graffiti workings upon them, and which have been variously, but not satisfactorily, explained, are not really whorls but were worn strung like beads, being pierced through the centre, and may have been amulets. The figures on the Assyrian friezes represent persons wearing necklaces and amulets formed of stone pierced through and engraved.

* Among the most interesting additions to the British Museum are the fragments of a throne in rock crystal which belonged to Sennacherib, and on which he may have sat when directing his haughty menace to Hezekiah. The throne appears to have been destroyed by fire. A curious fork was found by Mr. Smith in his excavations at Nimroud. It is a straight bident with a twisted handle, terminating in a horse's head. The workmanship is beautiful, but gives indications of Greek and Sassanian influence.

Since Mr. Newton delivered his opinion respecting the Hissarlick antiquities, the Society of Antiquaries has had the honour of receiving from Dr. Schliemann himself an account of his explorations on the site of the Homeric Troy. A short account of these will be read with interest in the "Proceedings for June, 1875," but they will eventually be published at length in the *Archæologia*. On this occasion the Society had the benefit of hearing the opinion of the late Prime Minister, Mr. Gladstone, so deeply versed in Homeric lore.

I cannot but express my pleasure that this subject should have been taken up at one of the meetings of the Bath Literary and Philosophical Association, and a very able paper read on the subject by the Principal of Prior Park College.*

Turning now from the Troad to the city of Ephesus and the excavations on the site of the Temple of Diana, conducted by Mr. Wood, that gentleman has found on the site of the Temple some Archaic sculpture evidently from the first Artemision, the building of which was going on about B.C. 560; and this Ephesian sculpture, says Mr. Newton, is singularly like in style to that from Branchidæ.† (*See Proc. of Soc. of Antiq.*, 1874, *Ap.* 30, *p.* 22.) Mr. Wood in June last laid before the Society of Antiquaries the result of his excavations, but regretted that the work had been arrested for want of funds. We hope that funds may soon be forthcoming, as important results may be anticipated if the excavations can be continued

* Since this was written the energy and perseverance of Dr. Schliemann has been further rewarded by discoveries at Mycenæ, which surpass anything found at Hissarlick.

† At the meeting of the Bib. Archæol. Soc., 4th Jan., 1876, Mr. Newton gave an account of "An ancient inscription discovered at Ephesus." The inscription was found incised upon a carved stone which had apparently formed the base of one of the pillars of the most ancient Temple of Artemis. The characters belonged to an alphabet which is at present unknown, but resembles the Phœnician and was one of the local alphabets of Asia Minor.

The energy and spirit of Dr. Schliemann has not been without effect upon the German Government, and the exploration of the remains at Olympia have been begun, and a convention entered upon between the German and the Greek Government. The results of this attempt to investigate one of the most classic, if not the *most* classic spot of ancient Greece, may it is hoped yield an abundant harvest, and European scholars be rewarded with much treasure of knowledge and art of the best times of Greece, which now lies hidden. It is not my purpose to speculate, but only to note, and I will therefore pass on to state what has been achieved by one of our own countrymen in the eternal city, Rome, where excavations of no ordinary interest are making known to us much more accurately the sites and positions of historical edifices, and the plan of ancient Rome will soon be beyond dispute, as well as the subsequent additions in the times of the Empire. I ought however first to mention the most recent acquisition in Greek antiquities to the British Museum—a magnificent head of Aphrodite and the Castellani gems and bronzes. They are said to be the finest works of art extant. We owe much to Mr. J. H. Parker. But public interest is now awakened to the importance of this field of enquiry, and the Italian Parliament, which voted £1,200 for this purpose in 1872 and 1873, was so much pleased with the results obtained, that in 1874 it voted £2,000 for the purpose. By this means (says Mr. Parker) we have now the whole length of the Forum Romanum excavated and part of the Via Sacra. Further discoveries have been the completion of the platform of the Basilica Julia, extending from the Temple of Saturn to that of Castor and Pollux, exactly as described by Augustus in his celebrated inscription; under the north end of it the Cloaca Maxima has been found, with its original vaulting of semi-hexagonal character, called Etruscan, and exactly like the subterranean passage connected with the prison of the kings previously discovered by Mr. Parker, and both attributed to the same period by Livy.

The celebrated three columns, so long a matter of dispute in theory, are now proved to belong to the Temple of Castor and Pollux (*see Proceedings of Society of Antiquaries, June 25, 1874, p. 288*). I mention this discovery as one among many others which serve to show the value of well-directed excavations.

I may only now touch upon the discoveries at the Villa of Mæcenas, with its wall-paintings, and the opening of the new gallery of statues, busts, and bas-reliefs, by the Archæological Commission at Rome, which will prove of the highest value to antiquarian research.

Mr. Parker in his new work on the Archæology of Rome, gives a valuable and complete account of all that is known of the Egyptian obelisks now preserved at Rome, as well as of the Archæology of Rome itself.

"The excavations made for the drains of the new city (for practically Rome is being rebuilt) have brought many things to light previously not known, as the house of the Lamia, near that of Mæcenas, the latter of which is on a portion of the great agger of Servius Tullius. It is now clear that this great bank was covered with houses as early as the first century of the Christian era, and that a street was made in the inner Fosse. The houses rested against the sloping bank and had no back windows." Mr. Parker has traced the ancient Fosse of "Roma quadrata," the date of which cannot be precisely determined, and of the second wall, which is as old as the kings and still exhibits gigantic remains. The Seven Hills can now be shown to have been so many separate hill fortresses—distinct villages—till they were at a later period joined together by a series of mounds. The slopes round the edges of the summit platform, when not natural cliffs, were cut away and scarped. The valley between them was for the most part a swamp or covered with timber.*

It is time however that I turned from Italy to say something

* See *Athenæum*, Feb. 12th, 1876, p. 230.

of what has been done nearer home, and among monuments if not so classical yet full of interest from the obscurity that veils their origin. I should mention then the researches made by Lukis among the chambered barrows in Brittany. He has just supplied what was hitherto much wanted, a trustworthy guide to these interesting monuments with maps to elucidate their respective positions. Those who have in former years travelled in Brittany in search of these hitherto much neglected remains, have experienced the extreme difficulty of obtaining correct information, or of being able to group the monuments under distinct classes. This has now been done by Mr. Lukis in a very simple manner, and any members of this Club interested in megalithic structures could not do better than spend a few weeks in the summer in visiting this part of France. Having myself paid a visit to Auray in 1850, I can judge how much has been effected in elucidating these monuments since that time. We have not yet however arrived at a satisfactory explanation as to the date of their erection, or the people by whom they were constructed. Having touched upon megalithic structures abroad I must say a word about efforts made for their investigation at home. A member of our Club who some years ago very ably described one of the most ancient of these structures, that of Abury, in the "Wilts Archæological Magazine," has just been engaged upon Stonehenge, and has brought together all that has hitherto been said in past and present times about it, without attempting to theorise upon its builders or its object. This paper will shortly appear and will form an excellent sequel to the valuable notice of Abury, and the notice also of Stanton Drew by the same hand, in the "Royal Archæological Journal."*

It is hoped that the attention given to these monuments of our primitive ancestors may insure their preservation, and may at length induce our Government to take some steps to secure them as national property from destruction.

* The paper is now published in the "Wilts Archæological Journal, 1876."

The enlargement of the Railway Station at York has led to the discovery of the site of the ancient cemetery of the Roman Eburacum. The new Railway Station will stand on the former cemetery, and the excavations rendered necessary for the buildings have led to the discovery of many Roman remains. Three altars have been found, one dedicated to the "Genius Loci," like that a few years ago discovered in Bath. The altar was found in a little pile of *Cobbles*, at the head of a corpse, and a glass vessel near it.

Funeral Tablets and stone cists have also been found with Inscriptions, one to a *Decurion* or magistrate of the ancient city; and the interment also of a female where the back hair of the head with the pin of jet which kept it in place have both been preserved. An account of some of them will be found in the "Academy" of the 9th October, 1875.

Happily there is an excellent Museum for local antiquities at York, and a collection which will well reward examination, and the antiquaries of that city are not likely to let any object of interest which these excavations may yield pass by unnoticed and unrecorded.

Some other inscriptions, but not, with one exception, of any great importance have been found in the course of the past year.*

Mr. Bunnell Lewis, F.S.A., has communicated one to the Society of Antiquaries, found near Brougham Castle, in Westmoreland (*see Proceedings, May, 13th, 1875.*) It is Sepulchral. One has been found at Charterhouse on Mendip, the particulars of which have already been communicated to the Club. Should the remaining portion of this eventually be found, it will greatly increase its interest.

Passing from Roman to Mediæval researches, our own county

* The most interesting and important of these are the two small bronze plates with inscriptions in Greek, one dedicated to the *gods* of the *Pretorium* the other to *Oceanus* and *Tethys*, by Demetrius. The former is a singular confirmation of a passage in St. John's Gospel, xviii. 28.

has done more within the last few months to elucidate monastic remains than any other county. This Cistercian Abbey of S. Mary of the Cliff, at Old Cleeve, has been, by the permission of the owner, Mr. Luttrell, of Dunster Castle, and under the superintendence of an able antiquary, the Rev. Makenzie Walcott, F.S.A., recovered from the state of ruin and degradation in which it had been involved since the Dissolution. Some present here this evening may have in years past visited those very picturesque and interesting ruins, which have been described and illustrated in the "Proceedings of the Somerset Archæological and Natural History Society," (vol. vi, p. 89), but which were then in a lamentable state of filth and decay, having been turned to the purposes of farm buildings. The entire plan of the Abbey has now been laid bare, and many interesting tiles and fragments of sculpture been recovered. An account of the conventual buildings, together with an accurate plan, is given in the December number of the "British Archæological Journal" (1875, p. 402), and the writer of this description, Mr. Walcott, has just read another paper on it to the "Royal Institute of British Architects," in London, an abstract of which appears in the *Bristol Times and Mirror*, of Monday, Feb. 7th, 1876.

It may be in the recollection of some members of this Club that nearly ten years ago a portion of the remains of the Abbey at Keynsham was laid bare, in the process of clearing sites for villas. Happily, through the exertions of the Club, some of the remains were rescued from destruction, and what could not be purchased was recorded in their "Proceedings," and an account also sent to the Society of Antiquaries. These remains have now attracted the attention of the Archæological Association, at their meeting in Bristol in 1874, and a paper upon them has appeared in the *Journal* (June 30, 1875), in which drawings and details are given, but these fall far short of what has been done at Old Cleeve by Mr. Walcott, whose plans and explanations help us most materially in understanding the arrangement

of Cistercian Abbeys. I am very thankful that this interesting spot, within an easy day's journey, is to form one of the subjects of our forthcoming excursions, that we may have the pleasure of seeing what the liberality of Mr. Luttrell, aided by the knowledge and energy of Mr. Walcott, has accomplished.* I must not forget to mention the formation of an Archæological Society for Bristol and Gloucestershire, which has commenced under good auspices, and may render very important services to its locality. We can only hope it will meet with cordial support. With this expression of good-will I must bring my remarks to a close, hoping that I have not trespassed too long upon the patience of the members, and that the results now brought under their notice may not have proved uninteresting.

Summary of Proceedings for the Year 1876-77.

MR. PRESIDENT AND GENTLEMEN,

Our Club attained its majority last February, the event was celebrated with the usual festivities on the 18th of that month at the York House, and the members mustered strongly on the occasion. Many who but rarely join the Evening Meetings or the Excursions think it their duty on these annual dinners to put in an appearance, and show their appreciation of the labour of the various officers of the Club by the heartiness with which they respond to the toasts when their healths are proposed.

After the Vice-President (the Rev. Prebendary Scarth) had given the usual loyal toasts, Mr. Skrine proposed the health of the President and Founder of the Club, the Rev. Leonard Blomefield, and alluded to the respect and regard which the members felt for one who had devoted so long a life to science,

* The excursion took place 27th and 28th July, 1876.

and whose fame as a naturalist extended far beyond the walls of this city. Though prevented from taking an active part in the Club's pursuits, yet Mr. Skrine felt sure that the President watched over its proceedings with the greatest interest, and was present with them in spirit though not in body.

Mr. Scarth then read an address which he had prepared on the General Progress of Archæology (*vide* p. 397).

Dr. Steele in a few well-chosen words returned thanks in the name of the members for the address, and spoke of the interest their Vice-President always took both in the physical and mental health of the Club.

Under the head of "Evening Meetings" your secretary has nothing to report except that the anticipated result has taken place, and members have ceased to offer any communications to the Club during the past year. This doubtless is due to the small attendance at past meetings and the general indifference thereby shown to the subjects brought forward.

EXCURSIONS.

May 16. Dolebury Camp and Banwell.—Owing to some mistake the Great Western Railway Company would not afford the usual advantage of reduced fares for a "pic-nic party" consequently the members, who mustered strongly, availed themselves of the roomy cattle pens wherein, to the discomfort of their passengers, the authorities pen their third-class animals, and took single tickets to Yatton. Thence a break and 'bus, both heavily laden, wound a tortuous way through dusty lanes and apple-blossoming trees to Congresbury Church. A little flutter and stir was perceptible at the Vicarage, attributed as a matter of course to the arrival of so many learned archæologists. Nothing of the sort, however; it was soon evident that their advent was rather unexpected, and that the true cause was to be sought in the arrival, which took place shortly after, of a village bridal party. In the absence of the vicar, the Rev. Prebendary Scarth, who joined the party at

Yatton, and Mr. C. E. Davis acted as ciceroni, and pointed out the architectural features of the vicarage and Church. Standing near the fine lime tree in the Vicar's pretty garden, Mr. Davis told them how the porch, with its imitation dog-tooth ornament, was the work of the executors of Bishop Beckington, about A.D. 1470—their crests being on the shield on the west of the doorway; the chief peculiarity in this old fifteenth century house consisting in the position of the principal rooms, which, instead of being on the same level, appear to have formed an upper storey. Passing round the outside of the Church, with its two curious square-headed windows, supposed to be Decorated, and spire-capped tower, a rare feature in Somersetshire Churches, Mr. Davis took the party inside; here their attention was drawn to the Early English pillars of the south aisle, with their four detached shafts, and the Decorated pillars on the north aisle, to the corbel on the north wall which formerly supported the beam of the rood-loft extending right across the church, to the fine arch under the tower, and to the extremely elegant and many-lighted clerestory of the early Perpendicular period.

Mr. Scarth supplemented Mr. Davis's remarks by an allusion to the ancient history of Congresbury. Formerly two Roman roads met here, and he considered it was most probably the site of an ancient Bishopric, and a place of great importance. An inspection of the parish registers, which the Vicar, Mr. Hunt, had courteously left out to view in the parvis chamber over the north porch, was made, and the party having resumed their seats passed beneath a mistletoe-bearing acacia and the fine village cross to the parish of Churchill, whence the Marlborough family derives its name.

Landed at the foot of Dolebury Hill, the day's chief business began. Ascending a winding pathway between cottages, the entrance to the camp was found blocked by a locked gateway, with a forbidding notice that the sacred rights of the rabbit-warren were not to be invaded without due permission. A geological hammer

was soon brought to bear on the staple, which, after a little persuasion, yielded to the necessity and admitted the party now considerably increased by an addition of fair enthusiasts from the Rectory of Wrington. At the entrance to the camp on the west, Mr. Scarth called attention to the double vallum, pointed out the defences on the opposite hill across the Bridgwater and Bristol road to protect the pass between that hill and the camp, and enlarged upon the Roman roads and various camps which crown the hills in the neighbourhood. The Secretary called attention here to an example of that remarkable variation of dip in the Mountain Limestone beds seen on the face of the opposite hill, changing from a northerly dip through the perpendicular to a southerly dip, assuming the shape of a fan.

Following the course of the ramparts running along the north side of the hill, and composed of an immense talus of loose stones which formerly crowned the ridge on that side probably in a more substantial shape, the highest point, 500 feet according to aneroid, was reached; here Mr. Scarth assayed to give a description of the extent and formation of the camp, only the main drift of which our chronicler could catch, owing to the impatient thirst for knowledge displayed by one of the members in his over anxiety to know where the stones came from, even the statement that they "grewed there" not satisfying him. From the plan exhibited it appeared that the length was 1,600 feet, the breadth 800 feet, and the acreage about $22\frac{1}{4}$, and that several Roman and Saxon coins had been found, together with iron spear-heads. The plan, which was a photograph from a survey made on the spot by Mr. Dymond in 1872, and exhibited by Mr. Scarth, deserves a place in the published records of the county. After a steep descent of 300 feet on the south into the ravine which separates it from Rowberrow, a serious obstacle presented itself in the shape of a stone wall of rather unusual dimensions for the Mendips; the rabbits again were the cause of this second hindrance. A lurking suspicion that there was something worth

having on the other side however armed even the most timid with courage. The wall was assaulted and won after various mishaps to the more weighty in years and honours, and thanks to the kind forethought of the Vice-President and his family there an ample and welcome lunch was spread out on the green sward ; cake, sandwiches, and other good things, it is needless to say, rapidly disappeared.

At the entrance to Rowberrow Church the inscribed stone over the south porch gave rise, as it always does, has done, and will do, to discussion, Mr. Scarth supposing it to be from 7th to 9th century date. Mr. Davis was again of assistance in pointing out the architectural features. On the way to Shipham a tumulus was visited, said by Mr. Scarth to have been opened by Mr. Skinner, of Camerton, without any results. The Secretary gave a short description of the geology of the district ; touched upon the Old Red axis of the hills, with the Mountain Limestone dipping away to the north ; spoke of the denudation which had taken place in past ages, the result of which was seen in the old water beach on which the members were then standing. It was in this conglomerate made up of the *debris* of the hills, cemented together by a Magnesian paste, that the "old men" made their workings, which would be passed at Shipham. Were these workings for calamine or lead-ore ? If for the former, was calamine known to the British as it seems to have been to the Romans ? Researches among the workings by local men would reveal this. After these remarks the Roman road was followed to the calamine pits which completely riddle the surface near Shipham, some specimens were taken, and Banwell was at last reached. A short visit was paid to what was originally an ancient house belonging to the Bishop of Bath and Wells now in the possession of Mr. Simpson, who, while making the additions necessary to constitute a modern residence, has sought to restore and preserve the form of the ancient building. The chapel formerly used as a cider cellar he has made into a library and decorated in a very elaborate manner. The

east window is filled with some good stained glass by Bell of Bristol, representing the profession of three nuns which is recorded to have been made at this place. Banwell Church was next visited where the fine tower and the ancient screen and pulpit were much admired, as well as the roof injured by modern colouring. The most indefatigable members of the party ascended the belfry to see the six bells it contains, and startled the birds with unwonted ringing, but rejoined the main body for dinner. Perhaps the least said about the dinner provided at the Ship Inn the best. Suffice it to say that the members duly reached Sandford, returned to Bristol, and thence by the Midland to Bath, after a pleasant ramble amongst the hills whose treasures were so well known to the old men from a distance, but whose arcana are but too little searched into by the new men who live at their feet. Mr. Scarth's guidance and information added greatly to the pleasure of the excursion.

June 20th, Abbotsbury.—Owing to the absence of your Secretary from England, and of the notes which had been promised him, there is no record of this Excursion. The arrangements were to travel by train to Weymouth, take break thence to Abbotsbury, lunch at the Ship Inn, and under the guidance of Mr. Charles Moore visit the iron ore deposits, the swannery and gardens, and return to Weymouth by the Chesil beach.

July 18th, Dunster and Cleeve Abbey.—This Excursion was at the July Quarterly Meeting, postponed till the 27th of that month, owing to the meeting of the Som. Arch. and Nat. Hist. Soc. having been fixed for that day. The following notes have been furnished by Mr. Scarth.

After an easy journey by rail about a dozen members found themselves at the very picturesque town of Dunster and lodged at the Luttrell Arms, a comfortable inn, retaining unmistakable features of former importance and of mediæval antiquity.

Immediately opposite their room was the curious old Market

Hall, called the "Yarn Market," Dunster being anciently known for its manufactures of Kerseymeres. From the steps of this picturesque wooden structure a view is obtained of the long street of the town which terminates in the Castle or the ascent to it, backed by the high ground of the Brendon Hills beyond. After carefully examining this structure the members proceeded to the Castle, which by the courtesy of Mr. Luttrell the present owner they were permitted to inspect, although the day selected by the Club was not the one allotted to visitors.

The history of the Castle reaches back to pre-Norman times, but from the Norman Conquest it is well ascertained, and may be read in "Collinson's History of Somerset" (*vol. ii., p. 7*). It was the stronghold of the Mohuns* and afterwards passed by purchase to the Luttrells, the present possessors. The original name is said to have been simply "Torre," to which the word "Dun," implying a hill or ridge of hills, was afterwards added, but a British derivation has also been suggested, as may be seen in the "Proc. of the Som. Arch. and Nat. His. Soc.," (*vol. v. p. 78. 1854.*) A concise and clear sketch of the history of the Castle is given in "Murray's Handbook of Somerset." It was erected by William de Mohun in the twelfth century, an attempt to besiege it was made by King Stephen. It is mentioned by Leland, but has been much altered since his time, and is now made a most comfortable residence. The Castle was besieged in the Civil Wars and surrendered to the Marquis of Hertford, after this the keep was pulled down, and the site of it converted into a bowling green. Each portion was duly inspected, as well as the paintings, one of the Protector Cromwell, and others family portraits, but the most striking feature is the commanding and picturesque

* Fifty-six manors or vills in the county of Somerset were appended to the grant of the Castle of Dunster and the ground on which it stands, by William the Conqueror.

situation of the Castle itself.* From the Castle an easy walk led to the Church then under restoration, which presents features not less interesting. It has been well described by Mr. Freeman in the "Proc. of the Som. Arch. and Nat. His. Soc." (*vol. vi. p. 1, et seq.*) Divided into two portions, one belonged to the Prior and monks of the monastery adjoining to it, the other to the Vicar of Dunster and the parishioners.

This double possession of large Churches in mediæval times was not uncommon. Instances are seen at Southwell Minster, and many others are enumerated by Mr. Freeman. A particular one occurs at Wymondham in Norfolk.

The Priory Church at Dunster was a college of the Abbey of Bath, and the Prior usually a monk of Bath. The history of the division of the Church is well known, and may be read in Collinson (*vol. ii. p. 18*). It originated in a quarrel between the monks and parish, and the dispute being referred for arbitration to the Abbot of Glastonbury and another, it was decided that each party should have their distinct Church. We see therefore in the present building how that arrangement was carried out.

The whole Church was under restoration on the visit of the Club, but it has since been completed and reopened for public worship. This restoration I believe is chiefly due to the munificence of the present lord of Dunster Castle, Mr. Luttrell.

Having examined the Church and tried to trace some of the conventual buildings, which are not very clear, though certain traces exist, the members ascended the opposite hill, called "Gallows Hill," to see an ancient camp said to be Roman. The walk is exceedingly picturesque, passing through the park and up a narrow dell till you reach the furzy down where the camp is placed. From hence there is a charming view looking

* The mound or torre on which the Castle stands is a natural formation, but the hill has been scarped. (See "Som. Arch. and Nat. His. Soc. Proc.," *vol. xviii. p. 11. p. 67.*)

back upon the Castle, and the town with its fine Church nestling at the foot, and beyond, the noble headlands of the Bristol Channel with its broad expanse of water, and the coast of Wales in the distance. The rampart of the camp is bold and well defined, but like most other defensive works of the same kind has suffered much from depredation for the sake of the material of which it is composed. Large gaps have been made in it and lowered it in places, but the original entrances are very distinct. It is much to be hoped that now these records of our early history will be better preserved, and that the proprietors of earthworks will not suffer them to be destroyed for the sake of the material. That this camp is Roman is very probable, because mining operations were carried on by that people in the Brendon Hills as well as in the Mendip Hills. These have been found at Luxborough and at Treborough, only four and six miles distant from Dunster, where the iron ore appears to have been worked by the Romans. "At Treborough and Luxborough in the rocks of the Devonian series, a peculiarly rich iron ore occurs, the quality of this metal is said to be equal to the best Silesian iron, and in quantity more abundant. That the Romans worked these mines is most clearly proved by the coins and mining implements which have been discovered in the refuse matters in the neighbourhood." (*See "Proc. of the Som. Arch. and Nat. Hist. Soc.," vol. vi. p. 144.*)

The camp at Dunster, situated so as to command both the Channel and the hills around, and to communicate with the anchorage on the Severn beyond, was probably a camp of permanent occupation.

From this interesting point the party watched the sun slowly sink behind the western hills, and then leisurely descended to their comfortable quarters at the Luttrell Arms to refresh and rest for the night.

The following morning an early start prepared the members for an important work—the examination of the remains of Old Cleeve

Abbey recently cleared of all unseemly obstructions, and the site of the Church which had been lost and covered with refuse, now clearly ascertained, and laid open to view. This work has been carried out by the liberality of the present owner, Mr. Luttrell, under the guidance of the Rev. Mackenzie Walcot, B.D., Precentor and Prebendary of Chichester.

Those who have in times past visited the very beautiful and interesting remains of Old Cleeve, and sighed to see the ruin and signs of desecration that hang over them, cannot but feel most grateful to the spirit and piety of the owner who has now rescued from destruction a spot once dedicated to holy purposes, and noted for the purity and simplicity of its style of buildings. Washford Station is but a short distance from Old Cleeve Abbey, and a brief walk brought the party to the entrance gateway which remains as it did in past ages. As this Abbey was Cistercian, and a very striking illustration of the buildings of that order, a word or two ought to be said as to its origin.

St. Bernard was the founder of the order, and one of their rules was that their buildings should be very simple and devoid of ornament. Carvings and pictures were originally prohibited, a painted cross of wood with two candles was the only decoration about the altar, and one image of our blessed Redeemer. The tower of the Church was stunted and only two bells permitted, a greater and a lesser, and the pavements were of plain tile. The fare of the monks was originally quite ascetic, consisting only of pottage with vegetables and a little wine or beer.

The monks were excellent agriculturalists, and wherever they settled, which was usually in remote and uncultivated regions, they soon changed the aspect of the country from barren moor to fertile meadow and corn land.

An Abbot with twelve brethren was the usual colony that settled where land had been granted to the community. The founder of Old Cleeve was one of the Mohuns, and Abbot Ralph the first abbot came from among the Lincolnshire Fens to settle

on the slope of the Brendon Hills, not far from the Bristol Channel and within sight of the Castle of Dunster. The first buildings were usually timber or wattled ozers, and consisted of a chapel and a dormitory, and these humble settlements by degrees grew into the majestic and imposing Abbeys, the remains of which adorn our beautiful valleys.

Each order had its peculiar arrangement of buildings. The date assigned to the "Abbey of St. Mary in the Vale of Flowers," now called Cleeve Abbey, is A.D. 1198.

In July, 1875, the ground plan of the Church was ascertained by Mr. Walcott; up to that time it had been doubtful. (*See "Proc. of Som. Archæol. and Nat. His. Soc.," vol. vii., p. 89. 89.*) The rubbish and buildings which encumbered the site were cleared away, and at the present time the whole plan and arrangements of the Church and monastery can be traced.

The Minster was 161 feet long, and of the purist and most severe type. The narrow lancet windows admitted no more light than was needed. The walls were coated with plaster marked with red lines to represent courses of masonry, and the floors covered with heraldic tiles. The arms of most of the leading families of the time can be traced; an account of them is given in Mr. Walcott's paper read to the Royal Institute of British Architects (31 *January*, 1876), and published by them. Another account is also published in the "*Journal of the Archæological Association*" (*December*, 1876, *vol. xxxi. p. 402*).

The nave measured 140 feet by 60, and was composed of five bays. The aisles were each 11 feet wide. The foundations only remain, except upon the south side where the wall still exists.

An excellent plan of the whole arrangement is given in Mr. Walcott's paper. To the south of the Church was the Cloister-garth, on the east side of which is the dormitory, still existing in good preservation, and the Chapter house, parlour and sacristy; on the south side was the refectory, the picturesque front of which still remains, which looked into the convent

garden ; on the north side of the cloister was the guest-house with the cellarage underneath.

Here then we have a perfect plan of the arrangement of a monastic house in the Middle Ages, and the student of antiquity and conventual history will have ample reward in visiting Old Cleeve.

The whole morning was spent there by the members and Mr. Walcott's plan and description was duly studied and appreciated. In the afternoon the Club walked to Blue Anchor, about three miles distant, taking the Church of Chapel Cleeve by the way.

It should be mentioned that an account of the charters and other archives of Cleeve Abbey has already been published (*See "Som. Arch. and Nat. His. Soc. Proc.," vol. vi*). These were collected and arranged by the late Mr. Hugo. Drawings also are given of the common seal of the Abbey, and of one of the Abbots, David Juynier, A.D. 1435-1466, and also of the gate house and part of the refectory. So that this interesting ruin has received the notice which it well deserves. Indeed the neighbourhood of Dunster has not only attracted the notice of the architect, antiquary and historian, but of the geologist as well. A paper on the geological formation of the neighbourhood by the late Mr. Arthur Jones will be found in the same vol. (*ut supra*).

A short walk after luncheon along the sea shore, to examine the alabaster rock near Blue Anchor, completed the second day's excursion, and the members of the Club returned home much delighted by their visit to Dunster and its neighbourhood. The harvest having commenced, and the sheaves of corn standing in the half-cut field, added not a little to the delight of the landscape in this most picturesque part of Somerset ; and the conjunction of wood, water, rock and turret, with the rich produce of the land, has left an impression on the mind which is as pleasant as it is enduring.

September 19th. Forest of Dean.—A visit to the Forest of

Dean brought the summer excursions of the Club to a conclusion. Every facility was afforded by the authorities at the Midland Station for the comfort of the members, and after an early start from Bath, Gloucester was reached in time to allow of a visit to the Cathedral by some of the more youthful and energetic; the others, more advanced in years and perhaps in wisdom, quietly awaited the departure of the train for Longhope, reserving their energies for the long day they had before them. At Longhope they were met by the Rev. Charles E. Dighton, Rector of Mitcheldean, who brought with him Mr. Richard Gibbs, a former *employé* of the Geological Survey, and one who has done good work in his day by collecting fossils for the Jermyn Street Museum. Without delay an exposure of olive-coloured micaceous mudstones close to the station was visited, and after a few words from Mr. Gibbs, pointing out their position as the Ludlow or Upper Silurian beds, dipping with their associated "tilestones" rapidly westwards under the Old Red Sandstone, the Secretary called the attention of the members to some of the geological features of the neighbourhood.

They were standing, he said, on the outer edge of one of those coal-basins, the existence of which, associated as they were with great disturbances of the strata, caused such a variety in the scenery and enabled them to know so much of the history of the rocks exposed by these movements. They had already visited the Bristol and Somerset coalfield, and were now able to cross that of the Forest of Dean; an irregular oval in shape, contained between the rivers Wye and Severn and the road from Gloucester to Ross, its longer axis from north to south was about ten miles, its shorter, from east to west, about six miles. Like the others, it was surrounded on all sides, with one slight exception, by the Carboniferous Limestone resting upon a base of Old Red Sandstone; on this side dipping with a high angle westwards, whilst on the opposite side these beds had more or less an easterly dip, thus forming a trough or basin which contained the coal. With

regard to the coal itself, Mr. Gibbs would no doubt answer any question they might like to ask him about its thickness, et cet.

After these few remarks, those who cared to look closely into the beds behind them were surprised at the abundance of fossils, indicating the richness of oceanic life which formerly teemed in the waters that deposited these shales.

By the forethought of the Rector, conveyances were in readiness to take the party to Mitcheldean, some however carrying out the programme and walking the two miles. The first object to be seen after the curious Old George Hotel was the Church, a rather singular structure, with the tower and spire over the south porch, and consisting of a central nave, with two north and one south aisle. A round font immediately to the left on entering was remarkable from the fact that it had evidently been turned topsy-turvy, and what was formerly the base roughly hollowed out for the water. It was once encircled with figures, probably of saints, which had been for some cause or other mutilated, half of their bodies having been cut off, and their feet now oddly appearing in a reversed position beneath an Early English flowing ornament. The plain Perpendicular piers of the nave were unattractive; as likewise were the windows, with this exception, that the head-lights of those in the north aisle contained some bits of 15th century glass of the same date as the windows themselves. Remains of an old painting on the west face of the chancel-wall, immediately over a modern erection (a very *rude* loft!) would have taken longer time to make out than was allowed, though the principal subject was evidently a Doom picture similar to that in the Gloucester Cathedral.

After partaking of the hospitality of the Rector and his lady, a sundial on the lawn, with its salutary mottoes of *ἡ γὰρ χάρις*—*In horo nulla mora*—*Pereunt et imputantur*—*Mispend no time*—suggested how quickly the precious minutes were flying and the necessity of going westwards to overtake the sun, unless a night in the forest was desired. The carriages were accordingly filled,

not to say loaded, and the kindly Rector taking charge of one portion of the scientific load, quickly showed that he had "handled the ribbons" many a time before. Passing rapidly through the village, a long hill checked the speed and enabled those who were so disposed to descend and trace the beds of Old Red Sandstone and Conglomerate upwards to their junction with the Carboniferous shales, here tilted up almost perpendicularly and succeeded by massive beds of Limestone. These latter were covered up near the brow of the hill by a *débris* of Milstone Grit, concealing, as Mr. Gibbs stated, more solid beds of that formation below. On the left a shaft was sunk through the Grit to "win" the ironstone here near the top of the Carboniferous Limestone. From this point the members passed on to the Coal beds proper, and entered the Forest by the Gloucester and Monmouth Road. Shortly after leaving Forest Church and crossing the new railway, three fine oak trees were seen on the left, remains of the ancient forest, one a maiden stick, the other a fine old pollard, called "Jack in the yat," which interpreted was said by Mr. Niblett, no mean authority in etymology, to signify "oak by the road." An upright stone, called the long stone, close to the edge on the right, evidently a *menhir*, indicated the close proximity of Stanton, the first halting place. The Church, not very inviting externally, save from the neatness of its well-kept churchyard, in pleasing contrast to the general look of unkemptness elsewhere, well rewarded those who entered. Its late Norman piers, supporting pointed arches, indicated its transition character; a curious square hollowed stone south of the central tower, said to have been once used as a font, seemed to bear about it traces of Roman origin, whilst the very curious stone pulpit attached to the north-west corner of the tower wall, and entered by an ingeniously contrived stone stair, which led on upwards to the rood loft, and then into the belfry, was of 15th century work.

Whilst the largest portion of the party was taken to see a

fine view to the north of the Church, the rest went about a quarter of a mile to the north-west to see the Puck or Goblin stone, a fine mass of Old Red Conglomerate, poised upon the rough projecting quartz pebbles at its base on another flat stone of a similar character, thus forming the only rocking stone in the county; the united efforts of three men could just make it move. Situated on the ridge of a hill and overlooking a fine expanse of distant wood and deep ravine, it must have formed a very important feature in the ancient history of the townspeople of Stanton.

A push had now to be made for "Speech House," through the important town of Coleford, past coal mines in full work, and others at a standstill, skirting wild-looking desolate quarries of yellow Coal-measure Sandstone (query, the pennant sandstone of the west?), until the last rise opened out the long-looked-for goal, where refreshment for man and beast was to be had at 4 p.m. If the dinner did not give entire satisfaction, the fault must not be laid at the landlord's door, for, however desirous of treating their guests well, landlords are after all dependent upon their cooks.

A few words of hearty thanks were given to the kind Rector of Mitcheldean for his admirable arrangements, by which so excellent an idea of the Forest had been afforded, and the members made a rapid return to Longhope through some of the finest forest scenery. Large oaks and hollies, not of yesterday's growth, woodland glades and ferny dells, strangely mixed up with smoky chimneys and huge cinder heaps, rendered the drive memorable, and anything but monotonous.

Walks.—The social Tuesday walks have been maintained with more or less spirit, the recent extremely wet weather has very much interfered however with the autumnal ones. Amongst those worthy of record was that taken on 16th January, to Bathford and Ashley Wood. Meeting Capt. Sainsbury at his gate the members were conducted by him in front of his house across the fields on to the

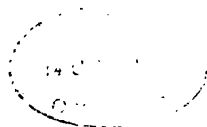
old London road ; following this up about a quarter of a mile a gate on the right hand led into Ashley Wood copse. Here an old way was traced on the left hand leading diagonally through the wood until it seemed to end near an excavation now grass grown, which had the appearance of having once been used as an old quarry. It is called the "Shambles" ; tradition has it that bulls were baited here formerly. A little to the N.E. of this runs a wall, at one point of which meet the three dioceses of Sarum, Gloucester and Bristol and Bath and Wells. Crossing a field to the W. called "Stallards," and formerly "Nemletts" and "Soap Leaze," the Secretary picked up several good flint "flakes" and chips and one well worked "scraper" 2.9-16 in. long and 1.1-16 in. broad at its worked end. On the opposite side of a road in a quarry at the edge of Farley Down Capt. Sainsbury pointed out a very remarkable bed of flints between two solid beds of Oolite. They were seen in a large mass or pocket on the left hand some 5 ft. deep, and ran round the top of the quarry about two feet from the surface, gradually thinning out from a thickness of some two feet to that of a few inches at the right hand corner. The flints were rolled, subangular, red and black on the outside. Passing over the Down to a summer house at the top of Capt. Sainsbury's field, the members found a lunch provided for them by the kind forethought of their friend and his sons. This was most thoroughly enjoyed, and a return made to Bath under the usual conditions of atmospheric moisture so prevalent of late.

Permit me in conclusion to bring a personal matter before you. This seems a fitting opportunity to express my earnest wish of resigning the secretaryship of the Club. For the last thirteen years during which I have been in office it has been my sincere endeavour to maintain the scientific character of the Club, and it has been a work of love to carry out the multifarious duties attaching to my post. The work now becomes irksome to me ; this warns me of the need that exists, if the Club is to maintain its position, of your appointing another Honorary Secretary. If

you cannot make your selection at once I will consent to remain a short time longer on one condition, that you will provide me with an Assistant Secretary who will help me in the excursions and various walks, and send to me notes of anything that may concern the objects for the investigation of which the Club was originally formed and for the pursuit of which may it long continue to flourish !

H. H. WINWOOD,

Hon. Sec.



R U L E S
OF THE
**Bath Natural History & Antiquarian
Field Club.**

1877.

- 1.—The Club shall be called “THE BATH NATURAL HISTORY AND ANTIQUARIAN FIELD CLUB,” and shall consist (for the present) of not more than One Hundred Members.
- 2.—The object of the Club shall be to make Excursions around Bath, with the view of investigating the Natural History, Geology, and Antiquities of the neighbourhood.
- 3.—The Founder of the Club, the Rev. LEONARD BLOMEFIELD, shall be considered the permanent *President*; and a *Vice-President*, *Chairman*, *Secretary*, and *Treasurer*, shall be chosen each year from among the Members at the Anniversary Meeting on the 18th February.
- 4.—Quarterly Meetings for the election of Members, and for other business, shall take place on the *First Tuesday* in April, July, October, and January.
- 5.—There shall be a Committee of Management, consisting of the officers and two other Members of the Club (the latter to be elected annually), whose business it shall be to consider and determine all matters connected with finance, and printing the proceedings of the Club, or papers read at any of its meetings; or any business requiring consideration previous to the Quarterly Meetings.
- 6.—There shall be Four Excursions during the year, to be fixed at the Anniversary Meeting, *subject to alterations* at any previous Quarterly Meeting, if agreed to by all the Members present—Six to form a quorum. A list of such Excursions, with the respective places of Meeting, shall be suspended in the Vestibule of the Bath Literary and Scientific Institution. Such Members as feel disposed shall also meet every *Tuesday*, at the Institution, at 10 a.m.-

- 7.—The hour of meeting shall not be changed, except for the convenience of taking particular trains, when it is arranged to go by rail to any place ; in which case the altered time shall be posted at the Institution not later than Twelve o'Clock on the Tuesday previous.
- 8.—In arranging the Excursions, due regard shall be paid to Natural History and Antiquities, so as to secure an equal share of attention to each subject ; with this view, when the same Excursion does not include them both, they shall, so far as practicable, be taken alternately.
- 9.—Special Meetings shall be appointed for the Reading of Papers or Exhibition of Specimens, notice being given to the Secretary at, or previous to, any one of the Quarterly Meetings, by Members having such communications to make to the Club.
- 10.—Persons wishing to join the Club may be proposed by any Member at one of the Quarterly or Special Meetings, and elected (by ballot) at the next meeting afterwards ; three black balls to exclude. The Committee shall have the privilege of electing four New Members during the year, provided there are vacancies.
- 11.—Any Member of the Club may invite friends to accompany them on the proposed Excursions.
- 12.—It shall be the business of the Secretary to take Notes of the Day's Excursion, and to draw up a Summary of the Year's Proceedings, previously to the next Anniversary ; he shall also see that the proper Notices of Excursions are suspended at the Institution, and communicate with the Members by letter, when occasion shall require. The Treasurer's accounts to be passed at the Anniversary.
- 13.—A Subscription of Ten Shillings shall be paid yearly by each Member, with an Entrance Fee of Five Shillings, to defray any expenses the Club may incur otherwise than by journeys and refreshments. This Subscription to be considered due on the Anniversary. Newly elected members to pay such a Subscription for the current year at the time of their election.
- 14.—Members whose Subscriptions are in arrear for one year shall be considered as having withdrawn from the Club, if, after application, the same be not paid up.
- 15.—There shall be a Supernumerary List for Members whose absence from Bath is only temporary. Such Members, on their return, and on payment of their Subscription for the then current year may be admitted to the Club at once, or so soon as a vacancy occurs.

H. H. WINWOOD,

Hon. Sec.

Field Club,

1877.

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